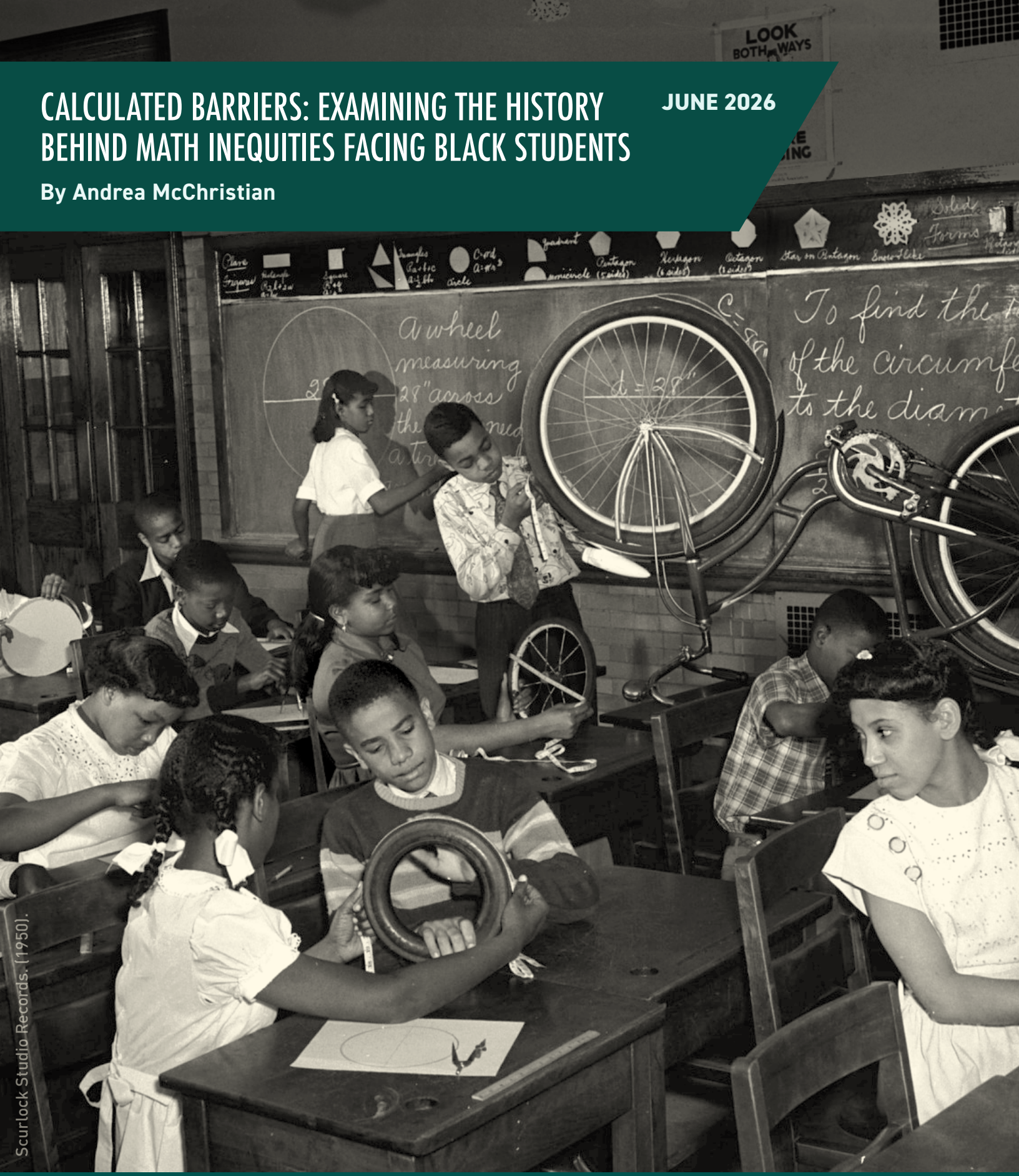
CALCULATED BARRIERS: EXAMINING THE HISTORY BEHIND MATH INEQUITIES FACING BLACK STUDENTS

JUNE 2026

By Andrea McChristian



Scurlock Studio Records. (1950).

JUST EQUATIONS

ACKNOWLEDGMENTS

I am grateful to the experts—Robert Q. Berry III, David Bressoud, Dia Bryant, Benjamin Moynihan, and Lya Snell—who reviewed an initial draft of this report. I would also like to thank my Just Equations colleagues Pamela Burdman and Shakiyya Bland for their comprehensive review and feedback, Zachary Fauconier and Alexis Robin Hale for their superb research support, Jenn BeVard for expertly shepherding the report through design and production, and Evan Nowell for ensuring that the report's message is clearly communicated. I also appreciate the contributions of copy editor Jane Steinberg, designer Tay Bird, and proofreader Yael Katzwer. Lastly, I would like to thank the representatives of the state departments of education who responded to my initial public records requests and subsequent follow-up questions.

ABOUT JUST EQUATIONS

Just Equations reconceptualizes the role of mathematics in ensuring education equity for students. An independent resource on the equity dimensions of math education in the transition from high school to college, Just Equations advances evidence-based strategies to ensure that math policies give all students the quantitative foundation they need to succeed in college and beyond. Just Equations' work is currently supported by College Futures Foundation and the Gates Foundation.

ABOUT THE AUTHOR

ANDREA McCHRISTIAN is the national policy director for Just Equations. Prior to joining Just Equations, McChristian served as policy research director at the Southern Poverty Law Center. Previously, McChristian served as the law and policy director for the New Jersey Institute for Social Justice, as a litigation associate with a New York law firm, and as a law clerk for Judge Petrese B. Tucker of the Eastern District of Pennsylvania. McChristian has a bachelor's degree in political science from Yale University; a master's degree in early childhood education from the University of Nevada, Las Vegas; and a law degree from Columbia Law School. McChristian also served as a Head Start teacher for two years in the Las Vegas Valley as a member of Teach for America.

CALCULATED BARRIERS: EXAMINING THE HISTORY BEHIND MATH INEQUITIES FACING BLACK STUDENTS

EXECUTIVE SUMMARY

Math literacy is essential in the 21st century to help us understand the world and meaningfully participate in our democracy. Numeracy skills are also critical for employment success, with AI and other technological innovations demanding a workforce that can engage in quantitative reasoning and data analysis. A high-quality math education is thus critical to preparing students for civic engagement and fulfilling careers.

Barriers to high-quality math education, however, can limit students' college and career goals. This is particularly true for Black students, who are disproportionately excluded and tracked away from high-quality math-learning opportunities. Limits on access at key transition points shape these inequities:

+ First, the most common path to high school calculus—a math course that is particularly significant for admission to selective higher education institutions—requires students to take Algebra I in middle school. This course, however, is not equally available to all students in their schools, a deficiency that disproportionately affects Black students.
+ Second, even if students successfully navigate middle school algebra, they must also reach and pass Algebra II, a stepping stone to advanced math. Equity issues also impede this access; Black students are less likely to be offered the course.
+ Third, colleges and universities often use students' advanced high school math courses, particularly calculus, as an admissions screen, interpreting such courses as proof that a student has taken the most "rigorous" coursework available at their school. Black students do not have the same opportunities to enroll in advanced math courses as their peers—even when they are qualified to do so. They also disproportionately attend schools that do not offer calculus.
+ Last, even when Black students who aspire to STEM careers are able to successfully reach college, they often cannot access calculus—the STEM major "gateway course"—directly. Instead, these students are often funneled into lengthy prerequisite sequences, which can disrupt and delay their path to a STEM degree.

One throughline persists: It is educational policies and practices—not Black students' ability to succeed in math—that have driven differential math outcomes by thwarting Black students' access to a quality math education. Indeed, Black students thrive in math when provided with encouragement and culturally relevant support that recognize their lived experiences.

Eliminating current math disparities to ensure that Black students are prepared to succeed in the 21st century requires examining their historical roots. *Calculated Barriers* traces pivotal moments in this history, focusing largely on the mid- to late 20th century, to explore how key inflection points have constrained Black students' access to mathematics—and, by extension, opportunity:

Segregated schools offered Black students expansive math options: Black students in some segregated schools had access to advanced math courses. Black educators had high expectations for their students and wanted to expose them to the math education necessary to prepare them for college and career success.

Post-desegregation tracking put Black students in lower-level math courses: After desegregation, many Black students were subject to racist stereotypes and beliefs about their math potential in newly integrated schools. As a result, Black students were often tracked into lower-level math courses that did not prepare them for college and career success.

Post-Sputnik advanced math opportunities were closed to Black students: The 1957 Sputnik launch spurred a desire for strengthened math education to ensure America maintained its global competitiveness. This led to a push for more students to take advanced math courses—including calculus—and an emphasis on preparing the most promising students to be successful in math. Due to invalid notions about their math abilities, Black students were mostly left out of this post-Sputnik fervor.

A Nation at Risk, with Black students shut out of advanced math coursework: The 1983 report A Nation at Risk led to the strengthening of math education, with many high schools across the nation increasing their math graduation requirements in response. Yet again, due to low expectations and barriers earlier in the math course sequence—including inequitable access to middle school algebra—many Black students were unable to access advanced math.

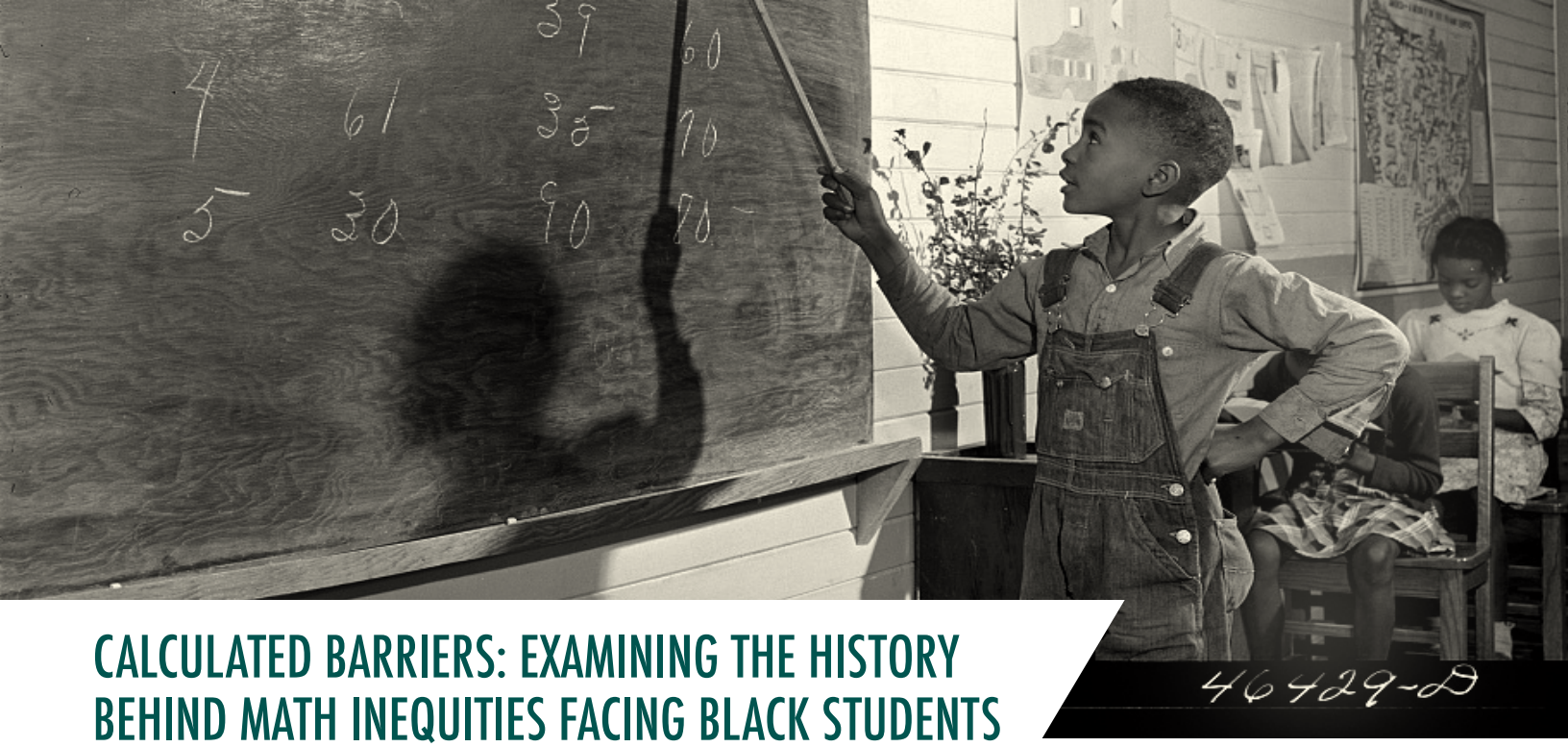
Civil Rights Era opens doors to college, but Black students are blocked from gateway courses: The Higher Education Act of 1965 led to an increase in Black students' access to and enrollment in higher education. Because of limited access to advanced math in high school, many Black students were tracked into remedial courses or, for STEM-aspiring majors, lengthy calculus prerequisite sequences. These barriers had the potential to negatively impact Black students' college success and entrance into STEM programs.

A NEW VISION FOR MATH EDUCATION

Providing access to a quality math education for all Black students requires a transformation of our entire math education system, including dismantling the gatekeepers that perpetuate inequity. It must be grounded in the belief that all students are capable of math success when provided with the proper support. In addition to helping Black students, such changes stand to benefit other groups that also have been excluded from math opportunity.

Below are key policy reforms that states, systems, and institutions can adopt to begin this transformation:

- **Redesign high school mathematics to dismantle barriers to advanced courses.**
- **End postsecondary access and admissions policies that perpetuate inequity.**
- **Eliminate lengthy postsecondary math prerequisite sequences.**
- **Invest in culturally responsive instruction and student-centered support.**
- **Align math policies across K–16 systems.**
- **Use data and accountability goals to ensure equitable educational policies and practices.**



CALCULATED BARRIERS: EXAMINING THE HISTORY BEHIND MATH INEQUITIES FACING BLACK STUDENTS

"History keeps talking back to us, if only we would listen." – ROBERT P. MOSES[1]

All Black children should have access to a high-quality math education that allows them to fulfill their dreams and ambitions.

Quantitative reasoning, data analysis, and mathematical fluency are requirements for many fulfilling, high-demand careers. Strong math skills are also tied to higher wages (Hanushek et al., 2013) and are critical to students' engagement with democracy (Burdman, 2025; Volić, 2024). Students must not only understand how math affects their voting rights, for example, but they also need a strong math foundation to analyze data on such social issues as climate change, policing practices, and public health outcomes.

Too often, though, our country's approach to math education features prominently among the barriers to opportunity Black students face. For decades, racial disparities in math outcomes have been a focus of news articles, research studies, and pilot programs.

One throughline has persisted: It is educational policies and practices—not Black students' ability to succeed in math—that have driven differential math outcomes.

Black students thrive in math when provided with encouragement and culturally relevant support that recognize their lived experiences (Leonard & Martin, 2013). Decades of intentionally exclusionary math policies and practices—including racialized tracking, diluted course offerings, and long on-ramps to college STEM degrees—have prevented many Black students from fully accessing the high-quality math education opportunities available to other students. Indeed, Black students have long been denied equitable access to a variety of math opportunities available to their peers—including middle school Algebra I, advanced math[2] coursetaking, and STEM major completion (Baker et al., 2023; Long et al., 2025; Riegle-Crumb et al., 2019).

[1] From "Returning to 'normal' in education is not good enough," *The Imprint* (2021, August 24), https://imprintnews.org/opinion/returning-to-normal-in-education-is-not-good-enough/58069.

[2] "Advanced math" generally refers to higher-level high school math courses available to students in their junior and/or senior years after Algebra II. These may include precalculus, statistics, data science, calculus, Advanced Placement courses, and/or dual-enrollment college courses. Some states allow courses such as statistics and data science to be taken in place of Algebra II.

Math barriers can affect Black students' job prospects, including in high-demand STEM careers: As of 2021, Black employees represented only 9 percent of the total STEM workforce, despite the fact that 12 percent of the total population ages 18 to 74 is Black (Grieco & Deitz, 2023, p. 6). The denial of quality math education opportunities can also lead to Black students doubting their ability to succeed in math—affecting their ultimate success in the subject (Gonzalez et al., 2020). To be sure, Black students are not the only group negatively affected by traditional math practices. Other research has explored, for example, the experiences of Latinx students, low-income students, female students, Native American students, and students with disabilities. This report focuses on Black students[3] in order to illuminate their persistent exclusion from educational opportunities, while recognizing that intersectionalities among these groups are also important to explore.

The disparities Black students face were not inevitable, but a direct result of the historical denial of opportunities. Reversing that pattern to ensure that Black students are prepared to thrive in the 21st century requires examining its historical roots. As Nicole Joseph and colleagues have highlighted, "Contemporary injustices in mathematics education are best understood by situating them within their historical contexts" (Joseph et al., 2021, p. 480). What if we deepen our inquiry into disparate math opportunities—and how to end them—by looking at their historical antecedents?

ABOUT THIS REPORT

Given its role as a gatekeeper to educational opportunity, math plays an important role in the history of Black students' education in the United States. *Calculated Barriers* challenges deficit-based assumptions about Black students and underscores the importance of culturally competent instruction grounded in a belief in Black children's talents. Examples throughout American history reinforce the fact that Black students succeed in environments of educational excellence that actively counter devaluing messages about their potential and help them "believe in their ability to achieve" (Walker, 1996, p. 219).

This report builds upon work done by a number of equity-minded researchers—Robert Q. Berry III, Maisie L. Gholson, Christopher C. Jett, Nicole M. Joseph, Gloria Ladson-Billings, Danny B. Martin, Crystal Morton, and Vincent Snipes, to name just a few—who have spotlighted that, with the proper support, resources, and opportunities for growth, Black students' math excellence can flourish. Importantly, it is not a comprehensive evaluation of Black students' math education in America. For that, Robert Q. Berry III et al.'s "A Critical Review of American K–12 Mathematics Education, 1900–Present," from Jacqueline Leonard and Danny B. Martin's 2013 book, *The Brilliance of Black Children in Mathematics: Beyond the Numbers and Toward New Discourse*, provides an invaluable account. By contrast, *Calculated Barriers* highlights some of the historical transition points at which Black students have been denied access to math opportunities.

Using publicly available data, this report provides an overview of the current landscape of math inequity for Black students, revealing how opportunity barriers along the high school math sequence limit college and job opportunities for Black students. The report uses archived newspaper articles to explore some of the origins of these current math inequities and to show their real-world impacts. Lastly, the report concludes by advancing policy recommendations that respond to this history, with a goal of supporting Black students in developing the math skills they need today.

[3] Black students are not a monolith, and the sources cited throughout this report use varying definitions of "Black" and "African American" that may fail to sufficiently recognize the diversity within the Black diaspora. While this report's narrative largely centers the experience of Black students whose ancestors were once enslaved in America, it must be noted that Black students from other backgrounds have had their own distinct interactions with our nation's education system—an area that warrants further research.

THE CURRENT LANDSCAPE OF MATH INEQUITY

The traditional three-course math sequence of Algebra I, Geometry, and Algebra II (AGA) traces its origins to a 130-year-old college preparation path (Moussa et al., 2020). The demand for a more math-literate workforce in response to the mid-20th century Sputnik satellite launch, however, led to a push for more high school students to take more advanced math course offerings. Thus, in addition to offering the AGA sequence—or an integrated math sequence (Math I, Math II, Math III) covering similar content—many high schools now also offer precalculus and calculus, with about half (48 percent) offering the latter course (U.S. Department of Education, 2025a, p. 7). To better align students' math options with their college and career goals and sufficiently prepare them for the needs of the 21st century workforce, states are increasingly redesigning high school math sequences to include new, modernized options, such as statistics, data science, computer science, and mathematical modeling (Bland et al., 2024). Today, more than half of all states offer such courses, in addition to the AGA or Math I–III sequence (Charles A. Dana Center et al., 2025, p. 2).

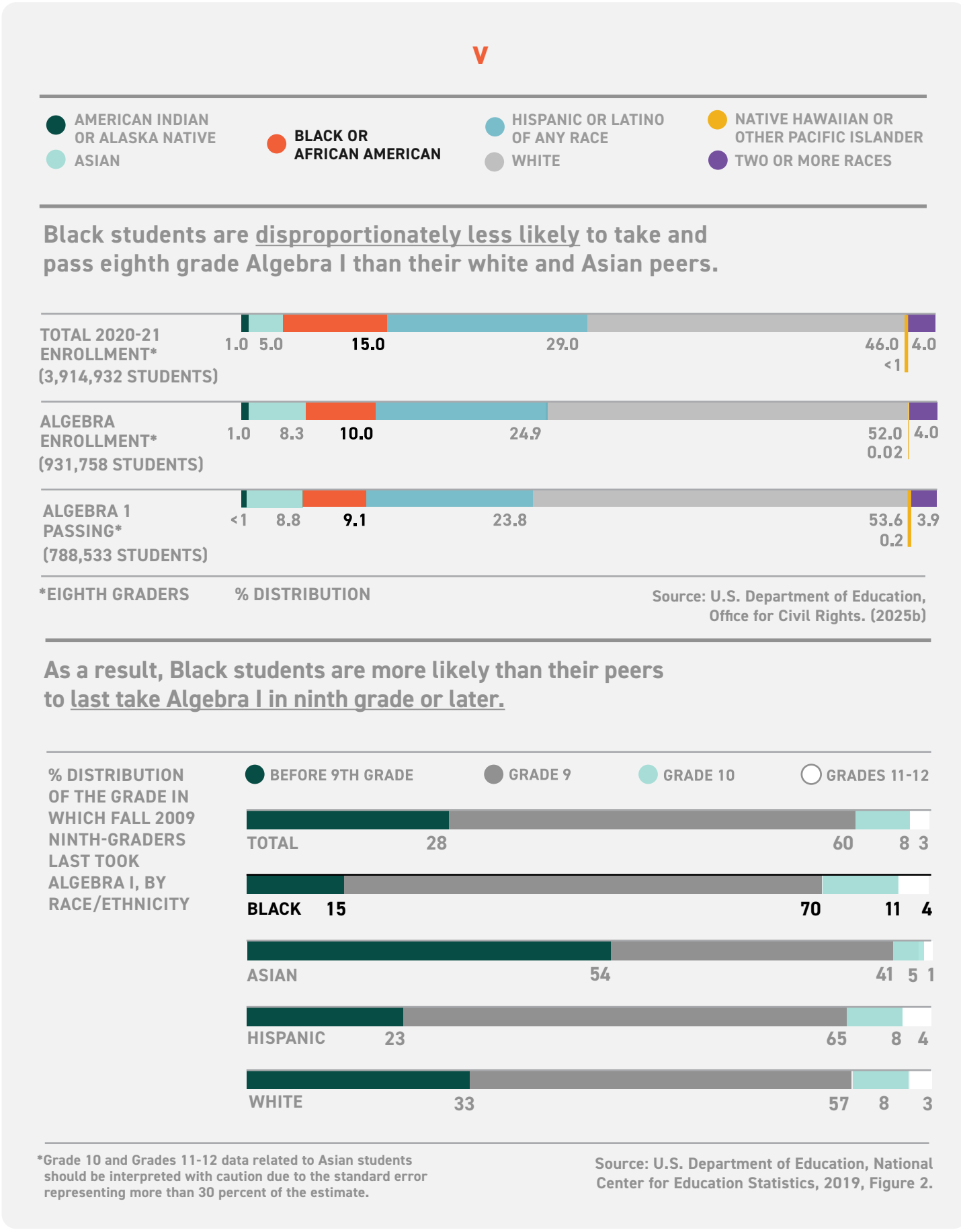
Barriers that begin before high school, and perhaps as early as kindergarten (Morgan et al., 2023), can have an impact on students' secondary math opportunities—potentially limiting their college and career goals. This is particularly true for Black students, who are disproportionately excluded and tracked away from high-quality math-learning opportunities. Limits on access at key transition points shape these inequities.

EARLY ACCESS TO ALGEBRA I

Early access to Algebra I has been linked to advanced math coursetaking in high school (McEachin et al., 2020) and higher college readiness (Dougherty et al., 2017). Most students must take Algebra I in middle school to be placed on an accelerated math sequence. But the merits of acceleration are strongly debated among education experts. While middle school algebra opens the option to take calculus—an unspoken admissions requirement at many selective higher education institutions—in high school, there is a dearth of research that shows calculus completion actually causes students to be more successful in college (Burdman et al., 2024). Still, there are other reasons for favoring early Algebra I. A strong trajectory in mathematics—including conceptual understanding and problem-solving—matters just as much in preparing students for life after high school. When students have the opportunity to take Algebra I in middle school, assuming they are sufficiently prepared for it, their success in the course can open doors to strengthened analytical and reasoning skills, advanced math in high school, and college and career pathways. And, while there are valid debates about whether (and for whom) early Algebra I is an effective strategy (Galanti et al., 2021), offering it to at least some students remains a priority in many districts and states.

As of 2020–2021, about a quarter (23.8 percent) of U.S. eighth graders were enrolled in Algebra I (U.S. Department of Education, 2025b).[4] While this number is not insignificant, it obscures the larger picture: Which eighth graders actually have access to the course? At 39 percent of the nation's public middle schools with seventh and eighth graders, no students took Algebra I in 2021–2022, because the course was not offered (U.S. Department of Education, 2025a, p. 7). Importantly, Black students also have inequitable access to middle school Algebra I.

[4] Eighth grade Algebra I enrollment (931,758 students nationwide) is 23.8 percent of total eighth grade enrollment (3,914,932 students nationwide).


AMERICAN INDIAN OR ALASKA NATIVE
ASIAN
BLACK OR AFRICAN AMERICAN
HISPANIC OR LATINO OF ANY RACE
WHITE
NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER
TWO OR MORE RACES
Black students are disproportionately less likely to take and pass eighth grade Algebra I than their white and Asian peers.
TOTAL 2020-21 ENROLLMENT* (3,914,932 STUDENTS)
1.0 5.0 15.0 29.0 46.0 <1 4.0
ALGEBRA ENROLLMENT* (931,758 STUDENTS)
1.0 8.3 10.0 24.9 52.0 0.02 4.0
ALGEBRA 1 PASSING* (788,533 STUDENTS)
<1 8.8 9.1 23.8 53.6 0.2 3.9
*EIGHTH GRADERS
% DISTRIBUTION
Source: U.S. Department of Education, Office for Civil Rights. (2025b)
As a result, Black students are more likely than their peers to last take Algebra I in ninth grade or later.
% DISTRIBUTION OF THE GRADE IN WHICH FALL 2009 NINTH-GRADERS LAST TOOK ALGEBRA I, BY RACE/ETHNICITY
BEFORE 9TH GRADE
GRADE 9
GRADE 10
GRADES 11-12
TOTAL 28 60 8 3
BLACK 15 70 11 4
ASIAN 54 41 5 1
HISPANIC 23 65 8 4
WHITE 33 57 8 3
*Grade 10 and Grades 11-12 data related to Asian students should be interpreted with caution due to the standard error representing more than 30 percent of the estimate.
Source: U.S. Department of Education, National Center for Education Statistics, 2019, Figure 2.

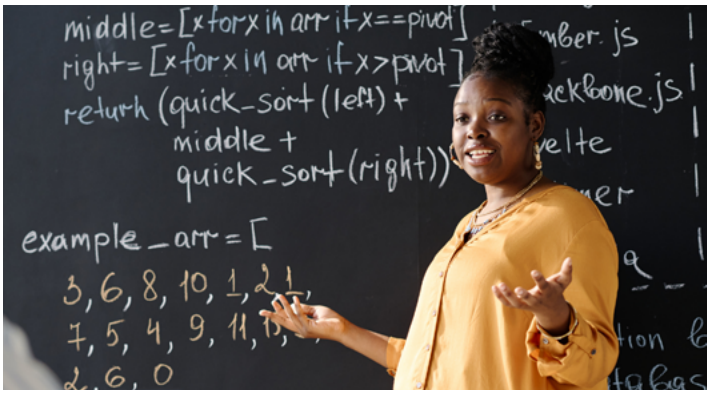
This story also plays out at the state level. For example, the New York Equity Coalition found that more than a quarter (27 percent) of New York state schools that serve seventh and eighth graders did not offer Algebra I in the eighth grade during the 2024–2025 school year. The state's Black and Latinx students were more likely to be enrolled in these schools than their white and Asian peers (New York Equity Coalition, 2026, pp. 5–6).

Furthermore, many Black students who have demonstrated readiness to take Algebra I in eighth grade do not take the course (Long et al., 2025). This is perhaps due to systemic biases in placement practices, such as negative perceptions of Black students' performance that may limit appropriate advising, as well as varying access to information about course options (Lewis & Diamond, 2015). It has also been suggested that teacher referrals carry more weight in schools with lower shares of Black and Latinx students (Covelli et al., 2024, p. 11).

ALGEBRA II COURSETAKING AS A GATEWAY TO HIGHER-LEVEL MATH

Algebra II has long been considered the gateway course to advanced math, and thus a foundational course for many STEM majors and degrees (Burdman, 2019). Notably, the relevance of traditional Algebra II—particularly for students who do not wish to pursue STEM careers—has been increasingly debated in recent years. Specifically, questions remain about how much Algebra II students actually learn in the course and the relevance of some covered topics (Bland et al., 2024; National Council of Teachers of Mathematics, 2018). In response, several states have developed high school math sequences that include additional course options, and some are modernizing Algebra II courses to offer meaningful preparation for students, regardless of their career goals (Bland et al., 2024; Charles A. Dana Center, 2020). Nevertheless, Algebra II remains a critical rite of passage in many states: Most four-year colleges and universities require Algebra II for admission, though, as of 2024, only 13 states and Washington, D.C., had made it a high school graduation requirement (Charles A. Dana Center & Education Strategy Group, 2025, pp. 8, 11).

Schools with high enrollments of Black and Latinx students are somewhat less likely (80 percent of schools) to offer Algebra II than schools with low enrollment of these students (85 percent) (U.S. Department of Education, 2025a, Figure 3). And, even for the majority of students whose high schools do offer Algebra II, timing matters. When a student takes the course can be key to their ability to access more advanced courses—and that timing is frequently a function of when they take Algebra I.



ACCESS TO ADVANCED MATH

Advanced high school math classes may await students on the other side of Algebra II. Algebra II and more advanced courses have been linked to higher college graduation rates and increased future career earnings (Adelman, 2006; Baker et al., 2023; Rose & Betts, 2004). Course options such as probability and statistics, data science, precalculus, calculus, dual-enrollment courses, and AP/IB math courses provide students with an opportunity to follow their interests and prepare for college success. On this point, some colleges look at whether students take advanced math courses—especially calculus—as well as how many of these courses students take (see Years of High School Math, p. 12), as a gatekeeper measure to compile their incoming classes (Burdman et al., 2024).

As with other milestones along the high school math continuum, access to advanced math courses is inequitable for Black students due to structural barriers earlier in the math sequence. In the 2021–2022 school year, 62 percent of schools with high Black and Latinx enrollment (compared to 71 percent of schools with low Black and Latinx enrollment) offered advanced mathematics (U.S. Department of Education, 2025a, Figure 3).[5] Critically, even where Black and Latinx students and students from low-income backgrounds take and pass Algebra I in eighth grade, they still take advanced math courses in high school at lower rates than their peers; this is likely due to factors such as school climate/culture, counseling practices, and educator bias (Baker et al., 2023).

Enrollment in Advanced Placement (AP) math courses provides another example of stratification: In 2021–2022, Black students accounted for 15 percent of total public high school enrollment but made up only 6 percent of students enrolled in AP mathematics (U.S. Department of Education, 2025a, Figure 6).[6] Colleges place a high value on AP coursetaking as a measure of students taking courses perceived as the most rigorous options available—but perhaps none so much as AP Calculus (Burdman & Anderson, 2022). This is the case even though calculus is relevant primarily for STEM-interested students and high school calculus coursetaking has not been tied to students being more successful in college. Nevertheless, while calculus is an explicit admissions requirement only for a few selective STEM-focused institutions, it is widely known to be a soft requirement in many admissions offices. In fact, when asked which math courses carry the most weight in admissions, more admissions officers chose AP Calculus than any other course (Burdman et al., 2024, p. 14). As a result, AP Calculus' continued use as an admissions screen means that students often feel the pressure to "race to calculus" in high school, in many cases rushing through high school math coursework without a full understanding of it. This push for calculus is reflected in the AP Calculus coursetaking numbers. In 2025, 285,891 students took the AP Calculus AB exam—an 81

[5] The 2021–2022 Civil Rights Data Collection defines "advanced mathematics" as covering the following topics: trigonometry, analytic geometry, math analysis, probability and statistics, and precalculus.

[6] AP math courses include Calculus (AB and BC) and Statistics, according to the 2021–2022 Civil Rights Data Collection (U.S. Department of Education, Office for Civil Rights, p. 51).

percent increase from 2002 (AP, 2026a), and 160,436 students took the AP Calculus BC exam, a 284 percent increase from 2002 (AP, 2026b).

This focus on calculus in the admissions process is to the detriment of other options that may be more relevant to students' majors and careers. On this point, while only 37 percent of admissions officers rank AP Statistics as one of the four math courses that carry the most weight in the admissions process (Burdman et al., 2024, p. 14), research indicates that high school students who take AP Statistics have similar long-term earnings to those who take AP Calculus (Giani et al., 2025)—showing why it is critical that courses besides calculus carry weight in admissions decisions.

Again, systemic barriers prevent Black students from engaging with calculus in equitable ways. While about 48 percent of high schools offer calculus, this figure drops to 35 percent for schools with high enrollment of Black and Latinx students, compared with 53 percent for schools with low enrollment of these students (U.S. Department of Education, 2025a, Figure 3). In fact, research shows that a larger percentage of Black students attend a school that does not offer calculus than students of other races/ethnicities (Cattell & Frankenberg, 2025). Furthermore, even at high schools that offer the course, some Black students may be tracked out of the path to calculus (Champion & Mesa, 2017). As of 2019, white high school graduates have completed calculus at three times the rate of Black graduates, and Asian graduates have done so at more than seven times the rate (National Center for Education Statistics, 2022, Figure 2). And in instances where Black students are able to take the course, their scores may disqualify them from receiving college credit. Between 1999 and 2019, the proportion of all AP Calculus exams with scores of 3 or higher that were earned by Black students remained stagnant at 2 percent (Bressoud, 2021a, p. 529). Even the College Board, which administers the AP Calculus exam, traces this to early barriers, recognizing that "equitable academic resources and opportunities in earlier grades are critical to eliminating racial/ethnic performance gaps in advanced classes" (Ewing & Wyatt, 2023, p. 6).

WHICH SCHOOLS OFFER CALCULUS?

It is known that some high schools offer calculus and others don't, but the reasons behind these differences must be further explored. While federal data provide state-level calculus coursetaking information by race and other measures through the 2020–2021 school year (U.S. Department of Education, 2025c), a deeper investigation into the issue of access at the school level is key to pinpointing needed state-level policy change to ensure that all students have equal access to the course.

To investigate this issue, Just Equations submitted requests for high school calculus enrollment data to dozens of state departments of education. The responses revealed a number of explanations for varying calculus access. For example, one state noted that a dearth of qualified teachers in more remote areas and school size may explain disparate calculus access. Policy Analysis for California Education (PACE) research found that seniors at smaller California high schools were less likely to be enrolled in calculus and AP Statistics and more likely to be enrolled in pre–Algebra II coursework (Larson et al., 2026, p. 7) than their counterparts at larger schools. PACE also found that a quarter of the high schools studied did not have any students enrolled in calculus, inferring that these schools did not offer the course (Larson et al., 2026, p. 12). Research has also shown that students living in urban or suburban areas are more likely to have access to calculus than their rural counterparts (Cattell & Frankenberg, 2025).

In addition, several states reported that they do not compile course enrollment data at the state level. This squares with research that shows that only ten states publicly report middle and high school mathematics coursetaking (Charles A. Dana Center & Education Strategy Group, 2025). Efforts to increase data collection appear to be expanding. In Washington, D.C., for example, tracking of enrollment data started in the 2024–2025 school year.

COLLEGE CALCULUS PREREQUISITES

Inequitable high school math policies also affect Black students when they get to college, leading to a misalignment for some students between their math skills and colleges' expectations of the math needed for certain majors. For example, calculus is often seen as the gateway college course to STEM degrees. Since many Black aspiring STEM majors may enter college with no previous exposure to calculus, due to the structural inequities described in this report, they may start higher education at a disadvantage.

In an ostensible effort to place STEM students in the most "appropriate" initial math course for their major, most colleges and universities utilize calculus placement tests to determine whether students are ready for calculus. These tests may result in students being placed into calculus prerequisite courses—college-level courses that do not meet the requirements for most STEM majors—instead of calculus. Equity issues are inherent in these placement patterns: For example, in the California State University, Black and Latinx students are more likely than other students to start their math sequence with calculus prerequisite courses, rather than with calculus (Burdman et al., 2021). This is a matter of grave concern, given that research has indicated that calculus prerequisites can serve as a major roadblock to STEM majors and degrees (Hsu & Bressoud, 2015). This issue is particularly significant for Black and Latinx students, who are more likely to leave and not complete STEM majors than their white peers (Eagan et al., 2014; Hatfield et al., 2022; Riegle-Crumb et al., 2019). Long calculus prerequisite sequences may also carry a heavy financial burden for Black students, who are more likely to take on student loans than students from other racial and ethnic groups, and more likely to default on their loans (Baum, 2019).

YEARS OF HIGH SCHOOL MATH

Another possible source of current math inequities is varying state policies concerning the years of math required for high school graduation.

Students whose states require four years of high school math tend to take more math courses than those in states that require fewer courses (Charles A. Dana Center et al., 2022). More math coursetaking is associated with higher college enrollment and increased career earnings (Bennett et al., 2023; Goodman, 2019; Wainstein et al., 2023). As of 2025, however, only 18 states and Washington, D.C., require students to take four years of high school math (Charles A. Dana Center & Education Strategy Group, 2025, p. 8).This variation in graduation requirements means that students' math coursetaking may largely depend on where they live, which may influence their college access. For example, a student who takes Algebra I in ninth grade in a state such as New York that has only a three-year high school graduation requirement might terminate their coursetaking with Algebra II, potentially weakening their ability to be admitted to a selective university that prioritizes four years of math. Another instance of this mismatch occurs in California. Although the Golden State requires only two years of math for high school graduation, with some districts requiring more, the state's public universities require at least three for admission, and recommend four (Gao et al., 2017).

TRACING THE ROOTS OF MATH INEQUITY FOR BLACK STUDENTS

Black people have a long global history of math accomplishment. From Egyptian number recording dating back to the third millennium B.C.E. to the Yoruba tribe's use of cowrie shells for counting and calculation in the 1800s, there are multiple examples of African cultures' use of numeracy to make sense of the world around them (Joseph, 2011). In America, Black students attending segregated schools engaged in rigorous math coursework and used this education to support their communities and open businesses (Joseph & Jordan-Taylor, 2016). In those schools, Black students benefited from an education that included "knowledge on the part of the teacher, not simply of the individual taught, but of his surroundings and background, and the history of his class and group" (Du Bois, 1935, p. 328). The legacy of American Black mathematicians includes Benjamin Banneker's contributions to the development of our nation's capital and Katherine Johnson's role in human space exploration at NASA. Today, organizations such as the Benjamin Banneker Association and the National Association of Mathematicians work to honor the history of Black mathematicians in America and to increase their number. Historically Black colleges and universities (HBCUs) have also played an important role in producing STEM professionals: As of 2020, HBCUs account for about a quarter of Black Bachelor of Science in mathematics and Bachelor of Science in the biological sciences graduates, and 17 percent of Bachelor of Science in engineering graduates, while enrolling only 9 percent of Black undergraduates (Wondwossen, 2020, p. 1).

Despite Black people's rich history of distinction in mathematics, policies and practices designed to maintain systems of oppression have consistently thwarted Black students' opportunities to access a quality math education. This is likely because the American educational system was built as a path to advancement primarily for white students, and the "long struggle over the development of education in the United States after the Civil War occurred largely in part because the dominant groups could not convince African Americans that their education relied on maintaining social order" (Smith, 2020, p. 59). This exclusion has also continued in more subtle forms, even amid seemingly well-intentioned efforts to expand math access for Black students. As Danny B. Martin (2009, p. 18) notes:

> *The early proponents of Mathematics for All and Algebra for All may have ... ignored the possibility that once African American students were granted access to gatekeepers like algebra, new gatekeepers and processes (e.g., high school exit exams, multiple versions of what is called algebra, stricter university entrance requirements; resistance from white middle- and upper-class parents...) would emerge to maintain the status of these students relative to students from white middle- and upper-class backgrounds.*

For Black students, the target has thus continually shifted; as one barrier in mathematics was

dismantled, another emerged to restrict access once again. Just as access to Algebra I was expanding in desegregated high schools, for example, the rising emphasis on more advanced courses introduced a new hurdle.

To design more equitable policies, we must understand how this pattern of gatekeeping laid the foundation for the inequities we see today. We trace pivotal moments in that history, focusing largely on the mid- to late 20th century, to explore how key inflection points have constrained Black students' access to mathematics—and, by extension, opportunity.

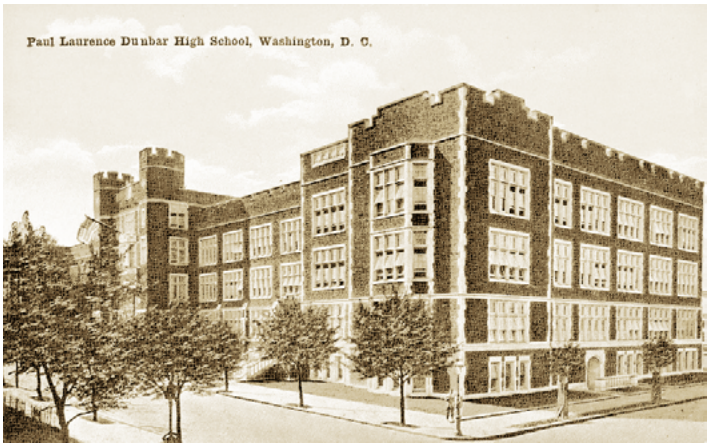
SEGREGATED SCHOOLS OFFERED BLACK STUDENTS EXPANSIVE MATH OPTIONS

Introductory algebra has served as the start of the college preparatory math sequence since the early 19th century, when it became a college admissions requirement at Harvard, followed by other institutions soon thereafter (Kilpatrick et al., 2006). In 1892, the National Education Association's Committee of Ten deemed Algebra I the start of the high school math sequence that would prepare students for college success (Moussa et al., 2020). The "order in which these mathematical subjects were first required for college entrance shaped, and continues to shape, the college-preparatory courses offered in secondary school, with each new requirement acting like a geological stratum laid down by natural forces and pressing the courses required earlier into lower grades" (Kilpatrick et al., 2006, pp. 4–5).

Black students in some segregated schools had access to Algebra I, indicating the primacy Black educators placed on Black students' college preparation despite the schools' limited resources. For example, in the years leading up to desegregation, some segregated high schools in North Carolina required students to take Algebra I to graduate, which was not a requirement at the state's white schools (Snipes & Waters, 2005). Students in some of Alabama and Texas' segregated Black schools were also expected to take algebra (Bozeman, 2021; Standish, 2006).

Several segregated Black schools also offered their students advanced math coursework beyond Algebra I. Some of these efforts, however, were met with pushback from white district officials. For example, Everett Dawson, a math teacher at an all-Black school in North Carolina, described the choices that were made to disproportionately exclude Black students from advanced math before desegregation (Foster, 1998, p. 5):

> *I often wonder if white folks really want black kids to be successful. I started the first advanced math class in Chatham County; this was at Horton, the all-black, segregated school. The advanced math class was a course where they got beyond geometry and algebra two. But when the county school officials found out what we were doing, they blocked the course. They cut it out until the white school could establish the course and catch up with us. That's how determined the white folks were to be better than we were.*



This intentional thwarting of Black students' access to advanced math was also evident at Dunbar High School in Washington, D.C., America's first all-Black public high school (Sowell, 1974, pp. 15–16):

> *Dunbar developed and thrived during its period of academic ascendancy in almost total isolation from whites. Even as a subject of research, Dunbar was as remote from whites as if it were on Mars. It was part of*

a dual school system ultimately controlled by whites, but the white officials took little interest in what was going on at Dunbar, and such interest as they did manifest took such forms as trying to get the school to move in a non-academic direction and resisting the demands of Dunbar parents for calculus courses and better chemistry labs. They casually destroyed the institution as an incidental by-product of their reorganization of the Washington school system in 1954.

These stories reinforce the high standards that many Black schools and educators under segregation had for their students in recognition of the numerous barriers they knew their students would face along their path to college and career.

POST-DESEGREGATION TRACKING PUT BLACK STUDENTS IN LOWER-LEVEL MATH COURSES

> **"One of the most segregated places in American society is the mathematics classroom." — LEE V. STIFF & WILLIAM B. HARVEY[7]**

Many Black students attending segregated schools had the support of Black educators who believed in their brilliance and ability. This same level of support, however, did not extend to Black students' educational experience after the 1954 Brown v. Board of Education case, which led to school desegregation. Following desegregation, about 38,000 Black teachers and administrators across 17 states lost their jobs (Milner & Howard, 2004, p. 286). As a result, many Black students in desegregated schools were often subjected to teachers who not only failed to understand their cultural experience or set the expectation that they would attend college, but, all too often, met them with racist stereotypes and beliefs about their intellect and math capacity. Take these remarks from Robert Bozeman, (2021) a mathematician and Morehouse College professor, talking about high school integration in Montgomery, Alabama, in 1965:

When we were in high school, we got a lot of nurturing from these Black teachers that encouraged us to go on to ... college. But as integration set in, this encouragement started waning. The whites were not as adamant about getting Black students to go on to college. We could see that.

Low expectations represented, and remain, a form of veiled racism, as overt racist stereotypes and perceptions about Black achievement began to be encoded in rhetoric that focused on such metrics as socioeconomic status and school readiness to explain differences in outcomes (Martin et al., 2019). It may therefore be no surprise that the term "achievement gap" began to grow in popularity a little over a decade after Brown v. Board of Education (Hill, 2016), cemented by the 1966 Coleman Report, a federal study about the availability of equal education opportunities that problematically landed on family background as a source of educational inequity for Black students (Coleman et al., 1966). Lowered expectations also became a justification for racialized tracking in newly integrated schools (see The "Insidious" Practice of Racialized Tracking, p. 16).

After integration, black students in desegregated high schools were often directed away from Algebra I and into non–college track, lower-level mathematics classes such as general math and consumer math (Berry et al., 2013). Algebra I thus emerged as one of the first math gatekeepers for Black students following Brown v. Board of Education. Significantly, there is an open question as to whether the courses offered to some Black students at that time in lieu of Algebra I even constituted "math": The Educational Opportunities Survey, for example, which formed the basis of the Coleman Report, specifically excluded commercial arithmetic and shop mathematics—courses sometimes offered to Black students—from being categorized as mathematics courses (Coleman et al., 1966; Wyoming State Archives, 2014).

[7] Stiff & Harvey, 1988, p. 190.

THE 'INSIDIOUS' PRACTICE OF RACIALIZED TRACKING

Tracking is the practice of moving students through course sequences that divide them into varying levels—such as "honors," "advanced," and "remedial"—of the same courses (National Council of Teachers of Mathematics, 2018, p. 16). The National Council of Teachers of Mathematics (NCTM) has condemned the tracking process as "insidious because it places some students into qualitatively different or lower levels of a mathematics course and, in some cases, puts students into terminal mathematics course pathways that are not mathematically meaningful and do not prepare them for any continued study of fundamental mathematical concepts" (NCTM, 2018, p. 16). As NCTM points out, the placement of students into tracks is often based on subjective expectations related to a range of factors—including race, language, and socioeconomic status—that have nothing to do with students' academic ability. The National Council of Supervisors of Mathematics has also spoken against the practice (2020).

Tracking has had—and continues to have—a harmful impact on Black students' experiences in mathematics. For example, research indicates that white math teachers at urban middle schools hold more negative views about their Black students—in terms of behavior, ability, student contributions, and emotional expectations—than both Black teachers at the same schools and white teachers of white students hold about their students (Battey et al., 2018). Black students who are tracked based on such subjective measures, rather than on their actual math ability, may be placed into lower-level courses replete with unengaging activities and less experienced educators (NCTM, 2018), negatively affecting their math education experience. A self-reinforcing pattern emerges from this practice: Students "judged to have low ability may get less because they are thought to need less (they are considered unable to benefit) or deserve less (they are considered unwilling to benefit)"—even though they actually need more (Oakes et al., 1990, p. 104). And once a student is tracked into a lower-level math course, it is extremely difficult for that student to move out of it, presenting a major barrier to students gaining a quality math education (NCTM, 2018).

Black educators showed concern that Black students were being tracked away from effective algebra courses. In 1974, for example, Lillian Gould, a Black high school math teacher and parent, sought to stop racialized tracking in Raleigh, North Carolina. Gould noted that most of the students in her Algebra 1-B course—the second part of an introductory algebra course for students school officials thought needed extra time in the course—were Black. According to Gould, this outcome was the result of intentional grouping and low expectations of Black students by both counselors and teachers. "I was told by the chairman of the math department not to try to teach those students too much," Gould said. "I was told not to teach theory, just show them how to get the answers. I was told that these students were not going anywhere" (Williams, 1974, p. 38).


Pictured: Lillian Gould

POST-SPUTNIK ADVANCED MATH OPPORTUNITIES WERE CLOSED TO BLACK STUDENTS

Only three years after Brown v. Board of Education held school segregation unconstitutional, the Sputnik satellite launch in 1957 marked another key event in math gatekeeper history. Fearing that the U.S. was falling behind in global competition, the federal government passed the National Defense Education Act (NDEA) in 1958. This provided an influx of federal funding to strengthen America's educational system, including math education. The bill provided more than $1 billion in funding for loans, scholarships, and graduate fellowships, and aimed to assist STEM students who needed financial support in pursuing higher education (Jolly, 2009). The NDEA's push for a math-proficient American workforce began to be realized through increased college enrollment, including in calculus, during the early 1960s. As four-year college enrollment rose by about 50 percent, undergraduate calculus

UNDERGRADUATE DEGREE-CREDIT ENROLLMENTS IN FOUR-YEAR COLLEGES AND UNIVERSITIES

YEAR	FULL TIME	PERCENT INCREASE FALL 1960 TO FALL 1965
FALL 1960	2,077*	52%
FALL 1965	3,159*	

TOTAL ENROLLMENTS IN UNDERGRADUATE MATHEMATICS COURSES IN FOUR-YEAR INSTITUTIONS BY LEVEL

LEVEL	FALL 1960	FALL 1965	PERCENT INCREASE FALL 1960 TO FALL 1965
Below Calculus	408*	527*	29%
Calculus	184*	295*	60%

*ENROLLMENT IN THOUSANDS

Source: Jewett et al., 1972.

enrollments grew by 60 percent between 1960–1961 and 1965–1966 (Jewett et al., 1972, tables 2.1, 2.6). This push for more advanced math was also seen at the secondary level, with the post-Sputnik fervor solidifying the AGA sequence to prepare students to take calculus and set them up for STEM careers (Burdman, 2015). Thus, even as Black students were struggling to gain equitable access to Algebra I, a new hurdle developed on their path to college and career success: taking Algebra II and reaching more advanced math courses.

Black students were not only overlooked by this post-Sputnik math push—they were intentionally excluded from it. For example, during congressional debates on the NDEA, liberal Democrats sought to add an anti-segregation amendment to force schools to comply with the Brown v. Board of Education decision. The bill's sponsors, however, "intended the bill to function within the existing system of segregation," and the legislation passed without considering the issue of segregation (Toritto, 2022, pp. 7–8). Further, post-Sputnik "new math," a math ideology that centered abstract concepts, de-emphasized memorization, and supported inquiry-based learning (Canzoneri, 2017), focused on supporting the most promising minds in the country; due to invalid notions about their math abilities and potential contributions, Black students were largely excluded from these reforms (Berry et al., 2013).

Of note, some Black students did benefit from the post-Sputnik and NDEA emphasis on math. For example, Shirley Malcom, a Birmingham, Alabama, middle schooler in a segregated Black school at the time of Sputnik's launch, noted that "there was a greater attention to science and mathematics everywhere, nationally, but even in my little school" (Zhorov, 2016). Malcom went on to earn a doctorate in ecology, stating, "I doubt very seriously that I would've ended up in science, had it not been for Sputnik, and had it not been for the national attention that something like an NDEA represented."

Malcom's story illustrates the high expectations Black educators and schools had for their students, not that the education system was embracing the math abilities of Black students. Overall, this moment in time presents yet another instance in which opportunities were denied to Black students based not on their ability, but rather on subjective beliefs grounded in racism.

AP courses, first created in 1955, were even further out of reach for many Black students. Through the AP program, high school students who were ready to take college-level coursework now had an opportunity to do so, an effort seen by some as a way to catch up to global competitors (Tugend, 2017). AP courses were also initially framed as an equity tool, providing an opportunity for all high school students who demonstrated readiness to take college-level coursework regardless of background (Bressoud, 2021a). Yet archival records, such as this reflection on the lack of Black students in advanced math classes in high schools in Albemarle and Charlottesville counties in Virginia in 1980, indicate that, based on subjective assumptions, many Black students were not encouraged to take AP programs (Giametta, 1980, p. E8):

> *An extremely small percentage of the advanced placement and accelerated course students are black. Guidance counselors say most black students do not take the preliminary courses needed to qualify for advanced classes. Also, counselors say, many black students work after school and do not have the time to devote to the volume of outside study required in accelerated courses. 'A lot of them are not interested in that kind of challenge at the high school level,' [Charlottesville High School] Guidance Director Jan Schwab said.*

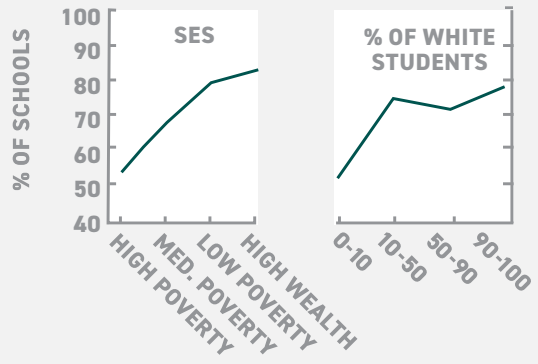
AP Calculus was developed in the 1950s, with calculus emerging as the preferred first-year college math course for math majors (Bressoud, 2021a; Bressoud, 2025). Within higher education, the importance of calculus only grew over subsequent years, with the course becoming a graduation requirement even outside of fields such as engineering that traditionally required it (Fey et al., 1981).

Starting in the 1990s, many students who took AP Calculus in high school also ended up retaking the course in college, creating a "self-reinforcing dynamic" in which high schools received the message that students had to take the course during their high school years to be competitive in the admissions process (Bressoud, 2021a, p. 523). This trend established the "race to calculus" in high school still present today, as well as calculus' role as an unofficial admissions requirement.

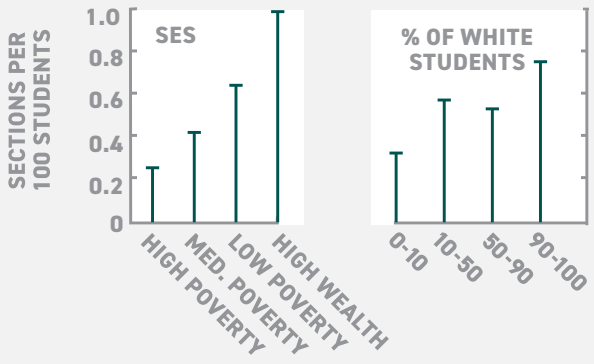
As with other advanced math courses, taking calculus was not expected of all students. Majority white and higher socioeconomic schools were more likely to offer the course, while some students were unable to access the course largely due to barriers earlier on in the math course sequence (Oakes et al., 1990).

In fact, in 1982, the Georgia NAACP filed suit against 13 Georgia school districts, alleging they were improperly segregating students by performance. In bringing the suit, Robert Flanagan, then the president of the NAACP's Georgia state conference of branches, called out school officials for claiming that Black students weren't reaching

HIGH SCHOOLS OFFERING CALCULUS CLASSES, BY SCHOOL SES AND RACIAL COMPOSITION*



NUMBER OF CALCULUS CLASSES PER 100 STUDENTS, BY SCHOOL SES AND RACIAL COMPOSITION*



*DATA RANGE : 1985–1986

Source: Oakes et al.,1990.

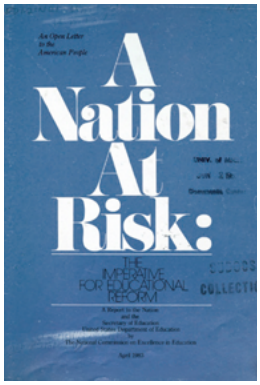
advanced courses because they "for one reason or another" had not taken the necessary prerequisites ("Educators profess surprise," 1982, p. 1B):

> *School desegregation took place 12 to 15 years ago. … We're talking about kids who have been labeled since day one as [educable mentally retarded]. … If they get that label when they're in first grade, then they're stuck in the slow classes the rest of their careers. We're talking about kids who haven't had a chance to take calculus.*

A dozen years later, in 1994, the Boston Public Schools district, 70 percent of whose high school seniors at the time were Black and/or Latinx (out of a total of 3,104 seniors), saw fewer than 50 students—including only three Black students—take calculus that year.[8] According to Anne Wheelock, then a middle school specialist and fellow at Northeastern University's Center for Innovation in Urban Education, this disturbingly small number reflected the "degree to which they are off the path that leads to college. … It has nothing to do with ability and everything to do with opportunity" (Hart, 1994, p. 33).

A NATION AT RISK, WITH BLACK STUDENTS SHUT OUT OF ADVANCED MATH COURSEWORK

The late 1970s through early 1980s was a time of waning confidence in American education, with stagnating academic outcomes, uneven success of desegregation efforts, a decrease in the number of teachers entering the profession, and falling K–12 enrollment (Hansen, 2024). Within this landscape, the 1983 release of the National Commission on Excellence in Education's *A Nation at Risk* report further cemented new advanced math requirements—and resulting inequities. The report, which evaluated the nation's education system, recommended a strengthening of high school graduation requirements, including three years of high school math (Gardner, 1983). States quickly responded to the charge: Between 1980 and 1989, 42 states increased their high school graduation requirements in math, science, or both subjects (Plunk et al., 2014, p. 231).



A Nation at Risk also led a number of states to formalize Algebra I as a high school graduation requirement (Berry et al., 2013) and fortified Algebra II as a necessary stepping stone to advanced math in high school, with the percentage of high school students taking Algebra II growing from a little over one-third to more than half between 1982 and 1992 (Smith & Choy, 1995, p. 4). Thus, just as Algebra I had become standard for a growing number of students, Algebra II was becoming the new math course floor for college and career success.

To prepare students for this new push toward advanced math, some high schools opted to eliminate pre-algebra lower-level courses and place students directly into Algebra I. However, it does not appear that Black students received support and

[8] These numbers exclude the city's three more competitive exam schools.

encouragement to ensure their persistence and success on this path (Berry et al., 2013). A 1987 story ("Officials: Segregation continues," 1987, p. 3C) on education in Charlotte, North Carolina, alludes to this:

> *Geneva Smith, a ninth grader at East Mecklenburg High School, is an example of a student who started in the academic mainstream only to become discouraged in an algebra class in which most students were white. "Everybody in there was smarter than me," she told The Charlotte Observer. Geneva transferred into general math. Now she's in the 10th grade, and math, for her, is basic skills. While students in algebra learn how to solve quadratic equations, she learns how to multiply a three-digit number and how to total purchases on a mail-order catalogue form.*

Even where there were efforts to support more students in reaching and passing Algebra I, these were not always long-lasting. For example, a 1988 *Oakland Tribune* article notes that a Berkeley High School program years earlier had placed students assigned to pre-algebra directly into Algebra I with additional support for students who needed it. Though the program was successful, it ended due to lack of funding (Link, 1988, p. B2).

And yet again, lower expectations and systemic bias interfered with Black students' opportunity to take advanced math coursework following *A Nation at Risk*. Discrepancies in students' math coursetaking had "little to do with ability because black students studied advanced math classes in large numbers before integration," Romanger Fredricks, a math supervisor in Volusia County, Florida, told the *Orlando Sentinel* in 1986. Her colleague, county school board equity director Bettye Bates, added that racism had gone "underground," replaced by fallacies about low achievement that Black students were at risk of internalizing. "It doesn't take but three years for them to know that something is wrong with them and they stop [trying]," Bates said (Pressley, 1986, p. 1).

This pattern of internalized discouragement was reflected in a 1984 review of Michigan's Huron and Pioneer high schools that revealed stark racial disparities in access to advanced coursework. There, only 22 (or 1.6 percent) of the 1,328 students enrolled in the 15 most challenging math courses offered at the two schools during the 1982–1983 school year were Black, even though Black students made up 17.6 percent of the total student population. Advocates showed concern that Black students "receive subtle negative messages from educators at an early age," giving them the idea that "expectations for them will be lower than for whites" (Dunn, 1984, p. C1).

MIDDLE SCHOOL ACCESS TO ALGEBRA I

The push for students to reach advanced math by high school graduation also led to a heightened focus on getting students to Algebra I by the end of middle school, to ensure that they had the option to take a calculus course in their senior year of high school. Although historically only students identified as "advanced" had access to Algebra I that early, a push by the Clinton administration in the 1990s to bring American students up to the math levels of their global peers set early access to Algebra I as a growing priority nationwide (Loveless, 2008). As a result, the percentage of eighth graders taking Algebra I rose steadily starting in the 1990s. In 1986, 16 percent of American 13-year-olds were taking Algebra I; this figure jumped to 34 percent by 2012 (U.S. Department of Education, various years, 1986–2023).

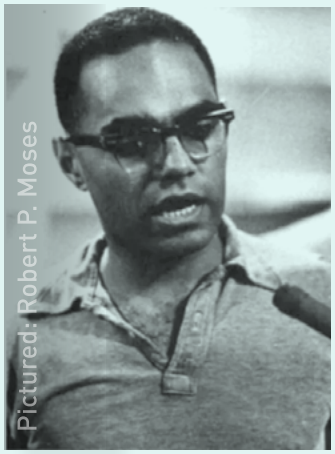
Black students faced barriers to early algebra coursetaking, as the 1990 example of a Florida school district's attempt to enroll more Black students in eighth grade algebra demonstrates. Osceola County school officials were concerned that only four Black eighth graders took algebra—a course they recommended for college-bound students—that year. "Traditionally, black students have been told they just can't succeed in math, that it's too difficult," said Candace Parker, the county's coordinator for secondary instruction, in a 1990

THE ALGEBRA PROJECT

"We believe that in the 21st century every child has a civil right to secure math literacy—the ability to read, write and reason with the symbol systems of mathematics." — THE ALGEBRA PROJECT[9]

In the early 1980s, Robert P. Moses, a former math teacher and Student Nonviolent Coordinating Committee organizer in Mississippi during the Civil Rights Movement, became frustrated after realizing that his daughter's Cambridge, Massachusetts, middle school did not offer algebra to eighth graders (Moses & Cobb, 2002). Recognizing that this would limit her and other students' opportunity to take advanced math in high school and attend college, Moses offered to provide in-school teaching to his daughter and other students to prepare them to take and pass the citywide algebra exam. This sparked Moses to found The Algebra Project, with a goal of setting up all students for completion of a college preparatory math sequence in high school. "If we can teach students algebra in the middle school years," Moses determined, "then we should do it." (Moses & Cobb, 2002, p. 93). Dubbing algebra "the new civil right," Moses recognized that math literacy was a key component of Black students' freedom and of meaningful participation in American democracy (Moses, 1993).

Since its founding, The Algebra Project has used community building, teacher professional development, and curricular interventions to support schools and communities in ensuring that students have access to the math education needed for success in college and career. Its work has been tied to increased math test scores, higher graduation rates, and more eighth graders taking Algebra I in its targeted districts and schools (Program Evaluation & Research Group, 2013).


Pictured: Robert P. Moses

The organization, inspired by Moses' vision, has also championed the establishment of a constitutional right to a quality public education as a necessary step to improve math literacy and address structural inequities (Moses, 2021; The Algebra Project, n.d.). The Algebra Project's efforts have additionally led to the development of The Young People's Project, a youth-led organization focused on young people teaching one another math (The Young People's Project, n.d.). The Algebra Project's work continues today: In 2025, the organization launched its Math Makes Movement national math literacy campaign, focused on shifting how math is taught, experienced, and valued, in partnership with communities in five anchor cities (Williams, 2025).

[9] The Algebra Project, n.d., https://algebra.org/.

interview with *The Orlando Sentinel*. "They have seen math as for whites only," Parker continued, noting that many students enrolled and remained in basic or remedial courses because no one had advised them as to whether they were ready for more rigorous coursework (Flowers, 1990, p. 18). That same year, a Texas paper recognized that many eighth and ninth grade Black students in Fort Worth, Texas, were subjected to non-college track courses such as the "dead-end 'consumer math,' the redundant 'pre algebra' or no math course at all," while their white counterparts were getting college-ready in algebra courses (Rogge, 1990, p. 23).

District efforts to push all students into eighth grade algebra were designed to ensure that Black and Latinx students were able to start their high school math journey on a path to advanced math courses, including taking calculus during their senior year (Carolan, 2014). These efforts had varying results. California's universal algebra effort, for example, may have increased algebra enrollment for historically underrepresented students, but it also corresponded to declining average scores on high school exit exams, including portions that required algebra skills (Domina et al., 2015). North Carolina districts had a similar outcome: increased passage of Algebra I by 10th grade but poor performance on the end-of-course Algebra I test (Clotfelter et al., 2012).

Challenges in eighth grade Algebra I often reflect unequal access to rigorous prior math experiences, inconsistent instructional supports, and insufficient opportunity to build foundational mathematical understanding (Domina et al., 2016; Steen, 1999). Some students deemed more advanced may have the option to take algebra even earlier in middle school and enroll in geometry or higher-level math course options in eighth grade (Domina et al., 2015), further expanding the divide.

Research also suggests that efforts to improve outcomes for Black learners cannot succeed without changes in classroom strategies that take into account their educational needs. Indeed, solutions offered to "fix" Black students often leave the institutions that shape their opportunities untouched and rarely question the American education system itself: its exclusionary design, its assumptions about who belongs in advanced mathematics, and the structural racism embedded in how participation is organized (Edwards et al., 2021). Danny B. Martin also sees the "Algebra for All" movement as "part of a larger assimilationist agenda that attempts to standardize all children by countering heightened racial consciousness and minimizing attention to forces like racism" (Martin, 2009, p. 18).

CIVIL RIGHTS ERA OPENS DOORS TO COLLEGE, BUT BLACK STUDENTS ARE BLOCKED FROM GATEWAY COURSES

The 1960s was an important decade for social change, with key legislation such as the Civil Rights Act of 1964 and the Voting Rights Act of 1965 bringing much needed expansion of constitutional rights for Black people in America. Within the education arena, legislation including the Higher Education Act of 1965 led to the increased enrollment of Black students in higher education (Thomas, 1988). Black students accounted for around 5 percent of college students in 1965; by 1975, they accounted for around 10 percent of all college students, or nearly 1 million students (U.S. Bureau of the Census, 1976). In fact, due to these federal policies and demographic changes, by 1975, Black and white high school graduates were enrolling in college at the same rate (32 percent), the only time this has happened, according to the most recent census data (Hill, 1984, p. 54; U.S. Census Bureau, 2023). This enrollment growth occurred despite the barrier posed by college admissions tests, which had racist origins and, in some instances, had been specifically used to depress Black student enrollment (Given, 2020; Hammond, 2020).

During the 1970s, as colleges increasingly adopted general education requirements, more and more students enrolled in mathematics gatekeeper courses (Burdman, 2015). Over the next few years, college math departments began to record an influx of students with limited algebra knowledge (Tucker, 2013). Since more students were required to take traditional, algebra-intensive math courses—even if those courses were irrelevant for their intended majors—remedial math course enrollments began growing. Between 1975 and 1980, enrollments in remedial courses grew by 72 percent, to make up 16 percent of all mathematical science enrollments at four-year colleges and universities and 25 percent at public four-year colleges (Fey et al., 1981, p. 2).

Despite the gains in Black students' college enrollment, many Black students were taking college math courses alongside peers who had had full access to the advanced high school math coursework and resources that would best set them up for college success—the very things that had long been denied to Black students. In 1969, for example, a Black Duke University student noted: "When I came here … they stuck me in a calculus class with a bunch of students who had all had calculus in high school. I was the only one who hadn't had it. All I had was two years of algebra" ("Preparation poor," 1969, p. A2). And, in 1981, according to the *Opelika-Auburn News*, recent Auburn University graduate Wilbur Owens went so far as to return to his old high school to urge leaders to add calculus to their math program, since so many of his fellow engineering majors had already taken it before college (AU News Bureau, 1981).

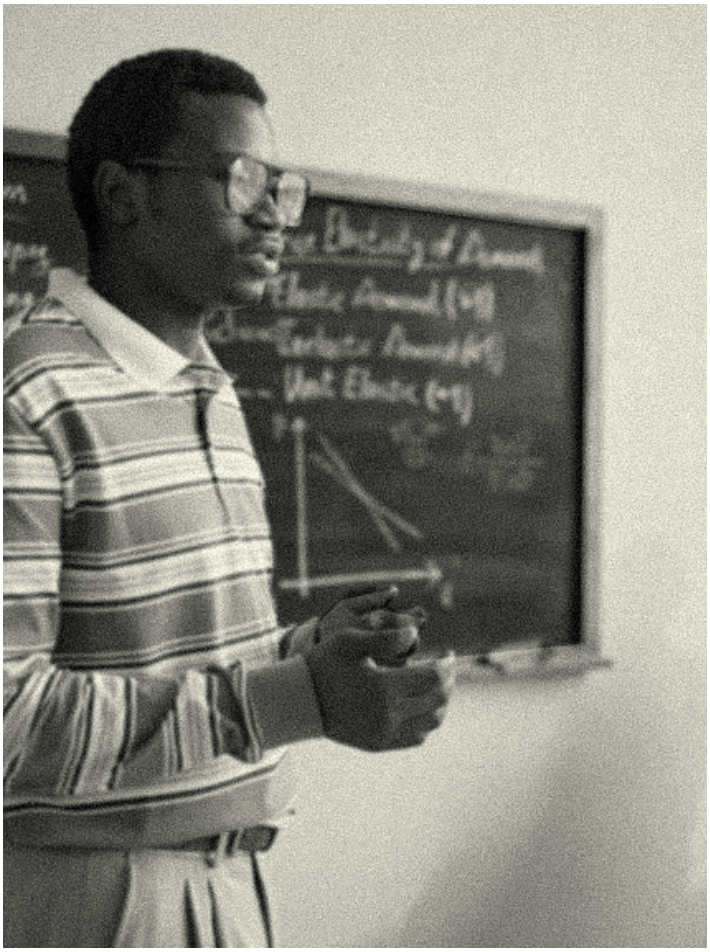
To respond to the challenge of seemingly "unprepared" students, colleges began to institute placement tests and offer prerequisite courses—including both noncredit remedial courses and college-level preparatory courses. Because inequity

begets inequity, many Black students who successfully made it to college had not had the opportunity to take advanced high school math courses—likely impacting their placement test scores. All too often as a result, these tests placed Black students into non–credit bearing remedial courses that did not ultimately support college completion (Brathwaite et al., 2020; Community College Research Center, 2021).

For STEM-aspiring students, calculus prerequisite courses were designed primarily to provide students seen as unprepared to enter calculus directly with a sequenced on-ramp to the course. In response to the belief that not every student would be prepared to enter directly into calculus, in 1965 the Mathematical Association of America (MAA) recommended that universities begin to offer Math 0, described as a precalculus course, although precalculus math topics had been taught in prior courses (Bressoud, 2021b; Duren, 1965). Many Black students were tracked into calculus prerequisites, as Professor A. J. Scavella of the Tuskegee Institute told the MAA in 1969 during reflections on HBCU math concerns (Scavella, 1970, p. 298):

> *In addition to the problem of attracting and retaining well-qualified faculties, mathematics departments at black colleges are confronted with the awesome and virtually impossible task of producing first-rate graduates who, many more times than not, must begin their collegiate study at the precalculus level. In most cases such students do not begin a study of calculus before the beginning of the sophomore year.*

Since that time, many colleges have expanded their offerings of prerequisite courses, with some offering as many as four prerequisite courses before calculus (Almora Rios & Burdman, 2023). But their effectiveness is in question, with some research suggesting that the courses don't improve—and may actually reduce—the likelihood of students, particularly those from underrepresented racial and ethnic groups, entering or completing STEM programs (Hatfield et al., 2022; Hsu & Bressoud, 2015; Seymour & Hunter, 2019; Sonnert & Sadler, 2014). Schools' efforts to



support students through prerequisite courses may have caused further harm, perhaps because these attempts at "fixing students" are founded on a deficit-based view (Hatfield et al., 2022).

An additional burden for some Black students who benefited from expanded college access was the pressure of being labeled "the first" or "the only." In one stark example from 1963, two newspapers reported on Dave McGlathery, the first Black student at the University of Alabama extension center campus in Huntsville. In June 1963, a New York newspaper noted that McGlathery planned to study calculus or another advanced math course; a few months later, a Michigan newspaper hundreds of miles away published the news that he may have failed the course ("Calculus, not race," 1963; "Negro student may have failed," 1963).

Three decades later, "Only Five Black Mathematicians at America's 25 Top-Ranked Universities," an article in *The Journal of Blacks in Higher Education*, pointed out that only four Black people in America had earned a doctorate in mathematics in 1992, a fact researchers attributed to racist beliefs about Black capacity. "In the view of the academic world," the authors note, "there was no use expending serious scholarly effort in preparing blacks for research or teaching in the most onerous and complex field of academic mathematics" (Cross & Slater, 1994, p. 74). And, while some Black students continue to persevere today to achieve their STEM dreams despite these myriad math barriers, the feeling of isolation still resonates for many. For example, mathematics professor Edray Goins, former president of the National Association of Mathematicians and president-elect of the Mathematics Association of America, explained his decision to leave his research university in 2017, stating that he was "tired of being the only one" (Goins, 2017).

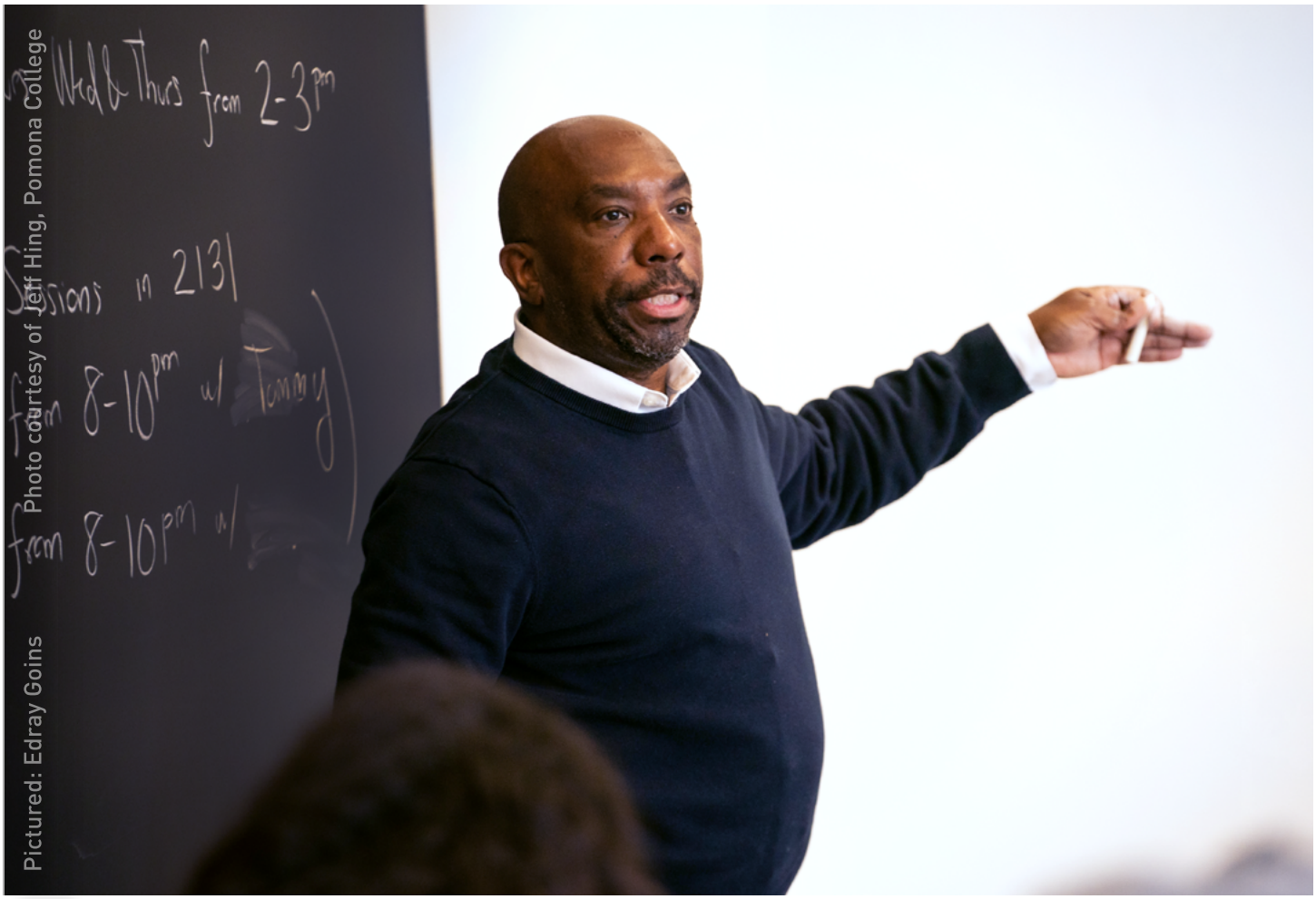


Photo courtesy of Jeff Hing, Pomona College

Pictured: Edray Goins

A NEW VISION FOR MATH EDUCATION

Exposing the problematic roots of math education for Black students is one step toward building a more equitable education for the next generation of students. The current moment positions us to realize this vision. States and organizations across the nation are leading innovations that can potentially increase equitable access to a quality math education.

A number of states, for example, supported by the Charles A. Dana Center's Launch Years Initiative, have **redesigned high school mathematics pathways** to enhance student engagement and better align the curriculum with students' interests. These redesigns include modernizing Algebra II to make it more relevant, developing new course offerings in addition to Algebra II, and restructuring math pathways so that students can reach calculus without having to accelerate in middle school (Bland et al., 2024; Charles A. Dana Center, 2020; Georgia Department of Education, 2023; Office of Superintendent of Public Instruction, 2023). States including Washington, Texas, and North Carolina have developed **automatic enrollment policies**, to ensure that students who have shown mastery of grade-level math coursework are automatically enrolled into Algebra I in middle school (ExcelinEd, n.d.).

Given the role that a student's math background can play in access to college, some postsecondary institutions have begun to reconsider how they use **calculus in the admissions process**. In particular, they are evaluating students' math coursetaking in the context of both the courses available to them and their educational goals (Burdman et al., 2024).

Colleges and universities are also redesigning their approach to mathematics readiness and success. Public universities in at least 29 states have adopted **corequisite strategies**, which can replace lengthy remedial math sequences (or, in some cases, college-level prerequisite courses) with just-in-time support in college-level gateway courses (Charles A. Dana Center & Education Strategy Group, 2025; Complete College America, 2021). The Emerging Scholars Program is a successful **learning community approach** that provides students, particularly students of color, with student networks and peer collaboration to support their sense of belonging in mathematics. It was developed at the University of California, Berkeley by then graduate student and teaching assistant Uri Treisman, who observed that many highly motivated Black and Latinx undergraduates were struggling in calculus, and it has been replicated at universities nationwide (Hsu et al., 2008; Treisman, 1992). Building on those efforts, numerous postsecondary institutions are also implementing **active learning strategies** leading to marked improvements in student success (Smith et al., 2021).

To confront and repair the historic inequities that have deprived Black students of meaningful math opportunities, policies must center Black students in math education reform—unlike prior policies, which prioritized white students (Berry, 2021). Providing access to a quality math education for all Black students requires a transformation of our entire math education system, including dismantling the math gatekeepers that perpetuate inequity. It must be grounded in the belief that all students are capable of math success when provided with the proper support. In addition to helping Black students, such changes stand to benefit other groups that have been excluded from math opportunity.

Below are key policy reforms that states, systems, and institutions can adopt to begin this transformation:

HIGH SCHOOL MATH REDESIGNS

Dismantle barriers to advanced high school math courses. Districts and schools should end gatekeeping practices that prevent Black students from reaching advanced high school math. Automatic enrollment policies, which place students who have demonstrated preparedness into advanced math courses based on certain metrics, enhance Black students' college opportunities. Effective implementation of automatic enrollment requires strong advising and annual monitoring to ensure it achieves the goal of equalizing access to advanced courses for all high-achieving students. In addition, states should offer paths to advanced math courses in high school, so that students who do not accelerate during middle school can still reach calculus. Schools should also provide access to a variety of options for advanced coursework in high school—including probability and statistics, data science, quantitative reasoning, precalculus, calculus, dual-enrollment courses, and AP/IB math courses—that are relevant to students' context, interests, and postsecondary goals.

POSTSECONDARY ACCESS AND ADMISSIONS

End admissions policies that perpetuate inequity. Because access to quality math educational opportunities is inequitable, higher education institutions must consider students' math coursetaking in the context of their aspirations and their high school's resources. Colleges should accept multiple advanced high school math courses—including statistics—for admission, so that students can select courses relevant to their majors and career interests. A preference for calculus should be limited to applicants pursuing majors that require calculus and whose schools offer the course. Rather than exclude students who lack access to calculus in high school, colleges should consider how they can best support such students to succeed in their programs.

POSTSECONDARY MATH PATHWAYS

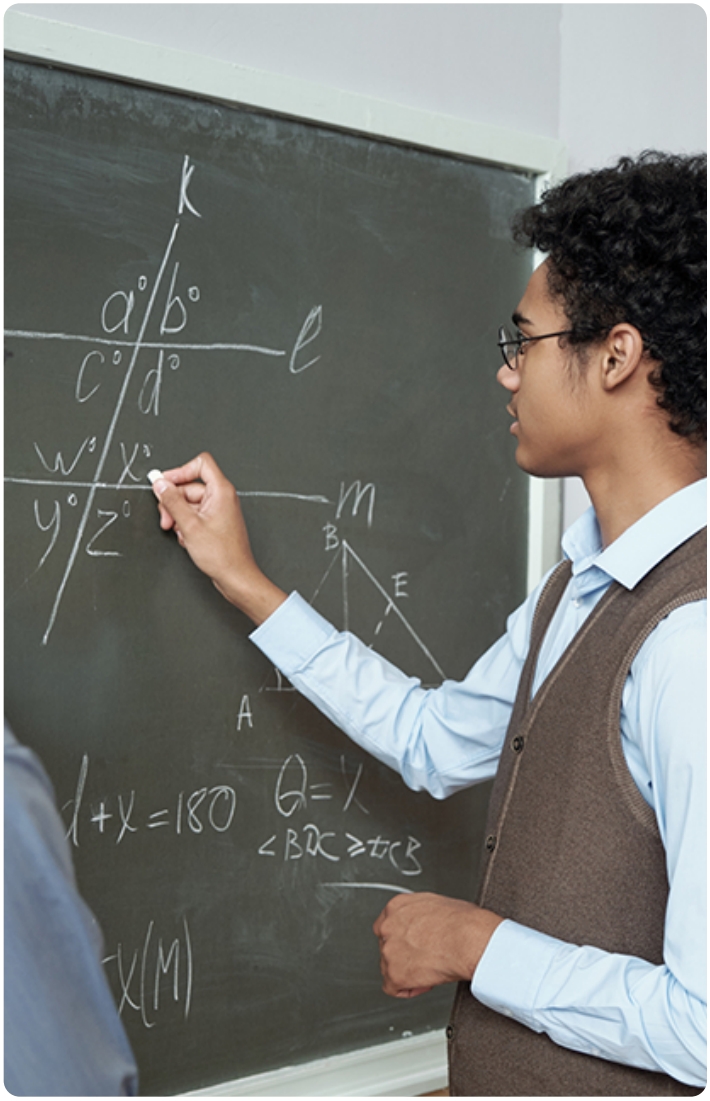
Eliminate lengthy prerequisite sequences. Long and questionably effective college math prerequisites—including remedial courses and calculus preparatory courses—can lead students to drop out of STEM majors and abandon STEM career goals. This is particularly a problem for students from historically underrepresented communities. To mitigate this, higher education institutions should place the majority of students directly into the gateway math courses needed for their majors, with corequisite supports. They should also adopt active learning strategies and implement support models such as the Emerging Scholars Program.

CROSS-SYSTEM ALIGNMENT FOR TRANSFORMATIVE CHANGE

Invest in culturally responsive instruction and student-centered supports. Culturally competent instruction and strong supports are needed in high school and college to ensure students have all they need to access and persist through a quality math education. Teachers and counselors who set high expectations are key to strengthening students' math identities. Recruiting and retaining Black teachers supports this goal (Carver-Thomas, 2018; Regional Educational Laboratory Northeast & Islands, n.d.). Culturally responsive resources and tools should also be developed to ensure students and families have all the information they need for student math success; for example, New York City Public Schools provides language assistance services for school- and student-related information in a number of languages, to ensure families can meaningfully engage in their children's education (New York City Public Schools, 2025).

Align math policies across K–16 systems. Systems should work in tandem to ensure that the math students are learning is sufficiently preparing them for entering college, graduating, and starting careers. States including Georgia, Oregon, and Utah—which have benefited from the Dana Center's Launch Years Initiative—are examples of how state systems have collaborated on course design, admissions policies, and dual-enrollment offerings. (Bland & Burdman, 2025; Charles A. Dana Center & Education Strategy Group, 2025).

Use data and accountability goals to ensure equitable educational policies and practices. Accountability is critical to ensuring true change in math education policy. States should gather longitudinal data on math course enrollment and make it publicly available in a user-friendly format. In addition, states should adopt annual goals for milestones, such as access to advanced high school math courses, direct enrollment in college-level math courses, and access to college STEM majors—and analyze those outcomes by key demographics such as race, ethnicity, and socioeconomic status.



This report concludes as it began: with the tenet that Black students should have access to a high-quality math education. Treating math literacy as a civil right, as The Algebra Project calls us to do, not only provides Black students with the opportunity to meaningfully engage in American society and prepare for college and career, but will also serve to rectify generations of harmful education policies. In this way, all students can access the high-quality math education that will allow them to truly thrive.

REFERENCES

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* U.S. Department of Education. https://eric.ed.gov/?id=ED490195

Almora Rios, M., & Burdman, P. (2023). *Staying the course: Examining college students' paths to calculus.* Just Equations. https://justequations.org/resource/staying-the-course-examining-college-students-paths-to-calculus

AP. (2026a). *Past AP Calculus AB score distributions.* https://apstudents.collegeboard.org/about-ap-scores/score-distributions/ap-calculus-ab

AP. (2026b). *Past AP Calculus BC score distributions.* https://apstudents.collegeboard.org/about-ap-scores/score-distributions/ap-calculus-bc

AU News Bureau. (1981, June 17). Recent Auburn graduate nears his boyhood dream. *Opelika-Auburn News*, A13.

Baker, M., Morgan, I., & Wade, G. (2023). *Opportunities denied: High-achieving Black and Latino students lack access to advanced math.* Just Equations & The Education Trust. https://edtrust.org/wp-content/uploads/2014/09/Advanced-Math-V9.pdf

Battey, D., Leyva, L. A., Williams, I., Belizario, V. A., Greco, R., & Shah, R. (2018). Racial (mismatch) in middle school mathematics classrooms: Relational interactions as a racialized mechanism. *Harvard Educational Review, 88*(4), 455–482. https://doi.org/10.17763/1943-5045-88.4.455

Baum, S. (2019). Student debt: The unique circumstances of African American students. In *Race and ethnicity in higher education: A status report.* American Council on Education. https://www.equityinhighered.org/wp-content/uploads/2019/02/REHE-Essay-Chapter-8-SA.pdf

Bennett, S. R., Bracco, K. R., Kurlaender, M., & Merritt, C. (2023). *Innovating high school math through K–12 and higher education partnerships.* Policy Analysis for California Education. https://edpolicyinca.org/publications/innovating-high-school-math-courses-through-k12higher-education-partnership

Berry, R. Q., III (2021, June 9). *Seeking racial equity and social justice in mathematics teaching and learning* [Workshop presentation]. MSRI Workshop on Mathematics and Racial Justice, online. https://docs.google.com/viewer?url=https://www.slmath.org//system/paperclip/documents/data/000/090/789/original/Berry_MSRI_2021.pdf

Berry, R. Q., III, Pinter, H. H., & McClain, O.L. (2013). A critical review of American K–12 mathematics education, 1900–present: Implications for the experiences and achievement of Black children. In J. Leonard & D. B. Martin (Eds.), *The brilliance of Black children in mathematics: Beyond the numbers and toward new discourse* (pp. 23–53). Emerald Publishing Limited. https://doi.org/10.1108/978-1-62396-081-0

Bland, S., & Burdman, P. (2025). *Aligned by design: How cross-system math alignment can improve students' pathways from high school to college.* Just Equations. justequations.org/resource/aligned-by-design-how-cross-system-math-alignment-can-improve-students-pathways-from-high-school-to-college

Bland, S., Burdman, P., & Baker, M. (2024). *Beyond algebra: High school math for a new generation.* Just Equations. justequations.org/resource/beyond-algebra-high-school-math-for-a-new-generation

Bozeman, Robert, October 19, 2021. (2021). Atlanta University Center Robert W. Woodruff Library. https://hdl.handle.net/20.500.12322/auc.277:Bozeman_Robert

Brathwaite, J., Fay, M. P., & Moussa, A. (2020). *Improving developmental and college-level mathematics: Prominent reforms and the need to address equity* (CCRC Working Paper No. 124). Community College Research Center. https://ccrc.tc.columbia.edu/wp-content/uploads/2020/11/improving-developmental-college-level-mathematics.pdf

Bressoud, D. M. (2021a). The strange role of calculus in the United States. *ZDM: Mathematics Education, 53*, 521–533. http://doi.org/10.1007/s11858-020-01188-0

Bressoud, D. (2021b, July 1). Thoughts on Advanced Placement Precalculus. *Launchings*, Mathematical Association of America. https://maa.org/math-values/thoughts-on-advanced-placement-precalculus/

Bressoud, D. (2025, February 3). *Part 1: A brief history of math instruction and how AI could change everything.* CA Education Learning Lab. https://calearninglab.substack.com/p/part-1-a-brief-history-of-math-instruction

Burdman, P. (2015). *Degrees of freedom: Diversifying math requirements for college readiness and graduation (report 1 of a 3-part series).* PACE & LearningWorks. https://edpolicyinca.org/sites/default/files/PACE%201%2008-2015.pdf

Burdman, P. (2019, June 27). Re-thinking the role of Algebra 2 in college readiness. *Just Equations.* https://www.justequations.org/blog/re-thinking-the-role-of-algebra-2-in-college-readiness

Burdman, P. (2025, June 17). What's math got to do with it? *EdTrust.* https://edtrust.org/blog/whats-math-got-to-do-with-it/

Burdman, P., & Anderson, V. (2022). *Calculating the odds: Counselor views on math coursetaking and college admissions.* Just Equations & National Association for College Admission Counseling. https://justequations.org/resource/calculating-the-odds-counselor-views-on-math-coursetaking-and-college-admissions

Burdman, P., Baker, M., & Henderson, F. (2021). *Charting a new course: Investigating barriers on the calculus pathway to STEM.* Just Equations & Learning Lab. https://justequations.org/resource/charting-a-new-course-investigating-barriers-on-the-calculus-pathway-to-stem

Burdman, P., Heller, R., & Baker, M. (2024). *The limits of calculus: Revisiting the role of math in college admissions.* Just Equations & National Association for College Admission Counseling. https://files.eric.ed.gov/fulltext/ED672570.pdf

Calculus, not race, on negro's mind. (1963, June 12). *Press and Sun-Bulletin*, 16.

Canzoneri, K. (2017). *Math education in the U.S.: A discussion of history, principles, and practice* [Senior theses, projects, and awards No. 431]. Swarthmore College. https://works.swarthmore.edu/cgi/viewcontent.cgi?article=1430&context=theses

Carolan, T. (2014, July 15–20). *Algebra for All: The hidden cost* [Meeting paper]. Joint Meeting of the International Group for the Psychology of Mathematics Education (38th) and the North American Chapter of the Psychology of Mathematics Education, Vancouver, BC, Canada. https://eric.ed.gov/?id=ED599777

Carver-Thomas, D. (2018). *Diversifying the teaching profession: How to recruit and retain teachers of color.* Learning Policy Institute. https://learningpolicyinstitute.org/product/diversifying-teaching-profession-report

Cattell, M., Jr., & Frankenberg, E. (2025). *Who takes calculus courses? An analysis of CRDC data from 2011–2021.* Advanced Equity. https://www.advancedequity.org/briefs/whotakescalculus

Champion, J., & Mesa, V. (2017). Factors affecting calculus completion among U.S. high school students. In D. M. Bressoud (Ed.), *The role of calculus in the transition from high school to college mathematics* [Report of the workshop held at the MAA Carriage House Washington, D.C., United States, 2016, March 17–19] (pp. 9–26). MAA Press. https://old.maa.org/sites/default/files/RoleOfCalc_rev.pdf

Charles A. Dana Center. (2020). *Launch Years: A new vision for the transition from high school to postsecondary mathematics.* https://www.utdanacenter.org/sites/default/files/2020-03/Launch-Years-A-New-Vision-report-March-2020.pdf

Charles A. Dana Center & Education Strategy Group. (2025). *Charting the course: The state of mathematics pathways for student success.* https://www.utdanacenter.org/sites/default/files/2025-07/Charting_the_Course.pdf

Charles A. Dana Center, Student Achievement Partners, & Education Strategy Group. (2022). *Re-envisioning mathematics pathways to expand opportunities: The landscape of high school to postsecondary course sequences.* https://edstrategy.org/resource/re-envisioning-mathematics-pathways-to-expand-opportunities/

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2012). *Algebra for 8th graders: Evidence on its effects from 10 North Carolina districts* (NBER Working Paper No. 18649). National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w18649/w18649.pdf

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., & York, R. L. (1966). *Equality of educational opportunity.* National Center for Educational Statistics. https://files.eric.ed.gov/fulltext/ED012275.pdf

Community College Research Center. (2021, July). *Policy fact sheet: Developmental education.* https://ccrc.tc.columbia.edu/wp-content/uploads/2022/04/developmental-education-fact-sheet.pdf

Complete College America. (2021). *No room for doubt: Moving corequisite support from idea to imperative.* https://completecollege.org/wp-content/uploads/2025/08/CCA_NoRoomForDoubt_CorequisiteSupport.pdf

Covelli, L., Kaufman, J., & Ozek, U. (2024). *Socioeconomic and racial discrepancies in algebra access, teacher, and learning experiences: Findings from the American Mathematics Educator Study* [Working paper]. RAND Education and Labor. https://www.rand.org/pubs/working_papers/WRA3554-1.html

Cross, T., & Slater, R. B. (1994). Only five Black mathematicians at America's 25 top-ranked universities. *The Journal of Blacks in Higher Education, 4*, 72–75. https://doi.org/10.2307/2963377

Domina, T., Hanselman, P., Hwang, N., & McEachin, A. (2016). Detracking and tracking up: Mathematics course placements in California middle schools, 2003–2013. *American Educational Research Journal, 53*(4), 1229–1266. https://doi.org/10.3102/0002831216650405

Domina, T., McEachin, A., Penner, A., & Penner, E. (2015). Aiming high and falling short: California's eighth-grade algebra-for-all effort. *Educational Evaluation and Policy Analysis, 37*(3), 275–295. https://doi.org/10.3102/0162373714543685

Dougherty, S., Goodman, J., Hill, D., Litke, E., & Page, L. C. (2017). *Objective course placement and college readiness: Evidence from targeted middle school math acceleration* [NBER Working Paper No. 21395]. National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w21395/w21395.pdf

Du Bois, W. E. B. (1935). Does the negro need separate schools? *The Journal of Negro Education, 4*(3), 328–335. https://www.jstor.org/stable/2291871?origin=crossref

Dunn, J. (1984, February 26). For Ann Arbor blacks, equal education is as elusive as ever. *The Ann Arbor News*, C1–C2.

Duren, W. L., Jr. (1965). A general curriculum in mathematics for colleges. *The American Mathematical Monthly, 72*(8), 825–831. https://doi.org/10.1080/00029890.1965.11970622

Eagan, K., Hurtado, S., Figueroa, T., & Hughes, B. (2014). *Examining STEM pathways among students who begin college at four-year institutions* [Commissioned paper]. National Academy of Sciences. https://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_088834.pdf

Educators profess surprise at NAACP discrimination suit. (1982, June 10). *The Macon Telegraph*, 1B.

Edwards, K., Johnson, S. L., Jr., McCabe, M., Montgomery, A., & Zoroya, L. (2021). *Supporting the African American learner: A guide for transforming beliefs, systems, and practices for Black students.* Los Angeles County Office of Education, Riverside County Office of Education, University of California Los Angeles, & Center for Powerful Public Schools. https://west.edtrust.org/wp-content/uploads/2024/02/Supporting-the-African-American-Learner.pdf

Ewing, M., & Wyatt, J. (2023). *Understanding racial/ethnic gaps in AP exam performance.* College Board. https://research.collegeboard.org/media/pdf/Understanding_Racial_Ethnic_Performance_Gaps_in_AP_Exam_Scores.pdf

ExcelinEd. (n.d.). [U.S. map of how 11 math principles are implemented, by state]. Retrieved March 15, 2026, from https://www.mathmatters.org/state-map

Fey, J. T., Albers, D. J., Fleming, W. H., & Lindquist, C. B. (1981). *Undergraduate mathematical sciences in universities, four-year colleges, and two-year colleges, 1980–81.* Conference Board of the Mathematical Sciences. https://www.ams.org/learning-careers/data/cbms-survey/CBMS1980-Report.pdf

Flowers, S. (1990, April 1). Schools hope to get more blacks to take algebra. *The Orlando Sentinel* 18.

Foster, M. (1998). *Black teachers on teaching.* The New Press. https://thenewpress.org/books/black-teachers-on-teaching/

Galanti, T. M., Frank, T. J., & Baker, C. K. (2021). Hyper-acceleration of Algebra I: Diminishing opportunities to learn in secondary mathematics. *Journal of Mathematics Education at Teachers College, 12*(1), 43–50. https://journals.library.columbia.edu/index.php/jmetc/article/view/7379

Gao, N., Lopes, L., & Lee, G. (2017). *California's high school graduation requirements.* Public Policy Institute of California. https://www.ppic.org/publication/californias-high-school-graduation-requirements/

Gardner, D. P. (1983). *A nation at risk: The imperative for educational reform.* National Commission on Excellence in Education. https://files.eric.ed.gov/fulltext/ED226006.pdf

Georgia Department of Education. (2023). *Personalized mathematics pathways: Opportunities for all Georgia students.* https://lor2.gadoe.org/gadoe/file/fc1b0ab2-545f-48f6-bc9d-fadde4d07d23/1/Personalized-Mathematics-Pathways-Information.pdf

Giametta, C. (1980, March 9). Advanced high school class participation heavy. *The Daily Progress*, E8.

Giani, M., Lyra, F., & Tyner, A. (2025). *Calculus or statistics: Does it matter?* Thomas B. Fordham Institute. https://fordhaminstitute.org/national/research/calculus-or-statistics-does-it-matter

Given, K. (2020, March 6). Newly found letters show how Texas Longhorns delayed integration. *WBUR.* https://www.wbur.org/onlyagame/2020/03/06/texas-football-segregation-marion-ford

Goins, E. (2017, September 15). Why I'm leaving a Research I university for a liberal arts college. AMS Blogs, American Mathematical Society. https://blogs.ams.org/inclusionexclusion/2017/09/15/why-im-leaving-a-research-i-university-for-a-liberal-arts-college/

Gonzalez, L., Chapman, S., & Battle, J. (2020). Mathematics identity and achievement among Black students. *School Science and Mathematics, 120*(8), 456–466. https://doi.org/10.1111/ssm.12436

Goodman, J. (2019). The labor of division: Returns to compulsory high school math coursework. *Journal of Labor Economics, 37*(4), 1141–1182. https://doi.org/10.1086/703135

Grieco, E., & Deitz, S. (2023). *Diversity and STEM: Women, minorities, and persons with disabilities 2023.* National Center for Science and Engineering Statistics. https://ngcproject.org/sites/default/files/downloadables/2025-02/Diversity%20in%20STEM%20Report%202023.pdf

Hammond, B. G. (2020, August 16). The SAT and systemic racism. *Inside Higher Ed.* https://www.insidehighered.com/admissions/views/2020/08/17/history-sat-reflects-systemic-racism-opinion

Hansen, M. (2024, January 30). 40 years after 'A Nation at Risk,' key lessons for reinvigorating America's teacher workforce. *The74.*https://www.the74million.org/article/40-years-after-a-nation-at-risk-key-lessons-for-reinvigorating-americas-teacher-workforce/

Hanushek, E. A., Schwerdt, G., Wiederhold, S., & Woessmann, L. (2013). *Returns to skills around the world: Evidence from PIAAC* (NBER Working Paper No. 19762). National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w19762/w19762.pdf

Hart, J. (1994, June 12). Mandating more math is urged. *The Boston Globe* 33, 36.

Hatfield, N., Brown, N., & Topaz, C. M. (2022). Do introductory courses disproportionately drive minoritized students out of STEM pathways? PNAS Nexus, 1(4), 1–10. https://doi.org/10.1093/pnasnexus/pgac167

Hill, H. C. (2016, July 13). 50 years ago, one report introduced Americans to the black–white achievement gap. Here's what we've learned since. *Chalkbeat.* https://www.chalkbeat.org/2016/7/13/21103280/50-years-ago-one-report-introduced-americans-to-the-black-white-achievement-gap-here-s-what-we-ve-le/

Hill, S. T. (1984). Participation of Black students in higher education: A statistical profile from 1970–71 to 1980–81. *Equity & Excellence in Education, 22*(1-3), 53–60. doi.org/10.1080/0020486840220107

Hsu, E., & Bressoud, D. (2015). Placement and student performance in Calculus I. In D. Bressoud, V. Mesa, & C. Rasmussen (Eds.), *Insights and recommendations from the MAA national study of college calculus* (pp. 59–68). MAA Press. https://maa.org/wp-content/uploads/2025/01/insights.pdf

Hsu, E., Murphy, T. J., & Treisman, U. (2008). Supporting high achievement in introductory mathematics courses: What we have learned from 30 years of the Emerging Scholars Program. In M.P. Carlson & C. Rasmussen (Eds.), *Making the connection: Research and teaching in undergraduate mathematics education* (pp. 205–220). Mathematical Association of America. https://www.cambridge.org/core/books/abs/making-the-connection/supporting-high-achievement-in-introductory-mathematics-courses-what-we-have-learned-from-30-years-of-the-emerging-scholars-program/194F9846FA026C25B1-135DE186862A73

Jewett, J., Phelps, C. R., & Lindquist, C. B. (1972). *Undergraduate education in the mathematical sciences, 1970–71.* Conference Board of the Mathematical Sciences. https://www.ams.org/learning-careers/data/cbms-survey/CBMS1970-Report.pdf

Jolly, J. L. (2009). The National Defense Education Act, current STEM initiative, and the gifted. *Gifted Child Today, 32*(2), 50–53. https://files.eric.ed.gov/fulltext/EJ835843.pdf

Joseph, G. G. (2011). *The crest of the peacock: Non-European roots of mathematics (3rd ed.).* Princeton University Press. https://www.ms.uky.edu/~sohum/ma330/files/crest_of_the_peacock.pdf

Joseph, N. M., Frank, T. J., & Elliott, T. Y. (2021). A call for a critical–historical framework in addressing the mathematical experiences of Black teachers and students. *Journal for Research in Mathematics Education, 52*(4), 476–490. https://pubs.nctm.org/view/journals/jrme/52/4/article-p476.xml

Joseph, N. M., & Jordan-Taylor, D. (2016). The value of a triangle: Mathematical education in industrial and classical schools in the segregated South. *The Journal of Negro Education, 85*(4) 444–461. doi.org/10.7709/jnegroeducation.85.4.0444

Kilpatrick, J., Mesa, V., & Sloane, F. (2006). *U.S. algebra teaching and learning viewed internationally.* IEA. https://www.iea.nl/publications/presentations/us-algebra-teaching-and-learning-viewed-internationally

Larson, B., Jackson, J., Bennett, S. R., & Kurlaender, M. (2026). *Subtraction and substitution: The role of schools in math course-taking* [Policy brief]. Policy Analysis for California Education. https://edpolicyinca.org/publications/subtraction-and-substitution-schools

Leonard, J., & Martin, D. B. (Eds.). (2013). *The brilliance of Black children in mathematics: Beyond the numbers and toward new discourse.* Emerald Publishing Limited. https://doi.org/10.1108/978-1-62396-081-0

Lewis, A. E., & Diamond, J. B. (2015). *Despite the best intentions: How racial inequality thrives in good schools*. Oxford University Press. https://global.oup.com/academic/product/despite-the-best-intentions-9780195342727?cc=us&lang=en&

Link, T. (1988, September 18). What went wrong with Berkeley's plan for schools. *Oakland Tribune*, B2.

Long, D., Kuhfeld, M., & Peters, S. (2025). *Unequal access to eighth-grade algebra: How school offerings and placement practices limit opportunity.* NWEA. https://www.nwea.org/uploads/unequal-access-to-eight-grade-algebra-how-school-offerings-and-placement-practices-limit-opportunity_NWEA_researchBrief.pdf

Loveless, T. (2008). *The misplaced math student: Lost in eighth-grade algebra.* Brookings Institution. https://www.brookings.edu/wp-content/uploads/2016/06/0922_education_loveless.pdf

Martin, D. B. (2009). Liberating the production of knowledge about African American children and mathematics. In D. B.

Martin, D. B., Price, P.G., & Moore, R. (2019). Refusing systemic violence against Black children. In J. Davis & C. Jett (Eds.), *Critical race theory in mathematics education* (pp. 32–55). Routledge. https://doi.org/10.4324/9781315121192

Martin (Ed.), *Mathematics teaching, learning, and liberation in the lives of Black children*. (pp. 3–38). Routledge. https://www.researchgate.net/publication/266535444_Mathematics_teaching_learning_and_liberation_in_the_lives_of_black_children

McEachin, A., Domina, T., & Penner, A. (2020). Heterogeneous effects of early algebra across California middle schools. *Journal of Policy Analysis and Management, 39*(3), 772–800. https://pmc.ncbi.nlm.nih.gov/articles/PMC8188827/

Milner, H. R., & Howard, T. C. (2004). Black teachers, Black students, Black communities, and Brown: Perspectives and insights from experts. *The Journal of Negro Education, 73*(3), 285–297. https://www.jstor.org/stable/4129612?origin=crossref

Morgan, P. L., Hu, E. H., Farkas, G., Hillemeier, M. M., Oh, Y., & Gloski, C. A. (2023). Racial and ethnic disparities in advanced science and mathematics achievement during elementary school. *Gifted Child Quarterly, 67*(2), 151–172. https://doi.org/10.1177/00169862221128299

Moses, B. (2021, August 24). Returning to 'normal' in education is not good enough. *The Imprint*. https://imprintnews.org/opinion/returning-to-normal-in-education-is-not-good-enough/58069.

Moses, R. P. (1993, November 6). *Algebra: The new civil right* [Address]. Strengthening Underrepresented Minority Mathematics Achievement Intervention Programs Conference II, Cambridge, MA, United States. https://algebra.org/2022/04/05/algebra-the-new-civil-right-1993/

Moses, R. P., & Cobb, C. E., Jr. (2002). *Radical equations: Civil rights from Mississippi to The Algebra Project.* Beacon Press. https://www.beacon.org/Radical-Equations-P283.aspx

Moussa, A., Barnett, E. A., Brathwaite, J., Fay, M. P., & Kopko, E. M. (2020). *A changing paradigm in high school mathematics*. Community College Research Center. https://ccrc.tc.columbia.edu/publications/changing-paradigm-high-school-mathematics.html

National Center for Education Statistics. (2022). High school mathematics and science course completion. In *The Condition of Education 2022*. Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/coe/pdf/2022/sod_508.pdf

National Council of Supervisors of Mathematics. (2020). *Closing the opportunity gap: A call for detracking mathematics.* https://www.mathedleadership.org/docs/resources/positionpapers/NCSMPositionPaper19.pdf

National Council of Teachers of Mathematics. (2018). *Catalyzing change in high school mathematics: Initiating critical conversations.* https://www.nctm.org/Store/Products/Catalyzing-Change-in-High-School-Mathematics/

Negro student may have failed math course. (1963, September 13). *The Kalamazoo Gazette*, 7.

New York City Public Schools. (2025). *Language access policy*. https://www.schools.nyc.gov/about-us/policies/language-access-policy

New York Equity Coalition. (2026). *Proficient and passed over: Disparities in eighth grade Algebra 1 enrollment.* https://equityinedny.edtrust.org/wp-content/uploads/sites/5/2026/04/Proficient-and-Passed-Over-2026_NYEC.pdf

Oakes, J., Ormseth, T., Bell, R. M., & Camp, P. (1990). *Multiplying inequalities: The effects of race, social class, and tracking on opportunities to learn mathematics and science.* RAND. https://www.rand.org/pubs/reports/R3928.html

Office of Superintendent of Public Instruction. (2023, October 12). Modernized math class prepares Washington students for the future. *Medium.* https://medium.com/waospi/modernized-math-class-prepares-washington-students-for-the-future-bfc060ea0897

Officials: Segregation continues in Charlotte despite busing. (1987, September 14). *The Durham Sun*, 3C.

Plunk, A. D., Tate, W. F., Bierut, L. J., & Grucza, R. A. (2014). Intended and unintended effects of state-mandated high school science and mathematics course graduation requirements on educational attainment. *Educational Researcher, 43*(5), 230–241. https://edpolicyinca.org/sites/default/files/2023-11/plunk-et-al-2014-intended-and-unintended-effects-of-state-mandated-high-school-science-and-mathematics-course.pdf

Preparation poor, Duke student says. (1969, February 16). *Winston-Salem Journal*, A2.

Pressley, P. (1986, July 27). Report: Schools bypass girls, Blacks. *Orlando Sentinel*, 1,10.

Program Evaluation & Research Group. (2013). *The Algebra Project: Overview of research & evaluation 1991–2013.* Lesley University. https://algebra.org/wp-content/uploads/2024/03/ResearchOverview-PERG1991-2013.pdf

Regional Educational Laboratory Northeast & Islands. (n.d.). Educator diversity matters. https://ies.ed.gov/sites/default/files/migrated/rel/regions/northeast/pdf/REL-NEI_Educator_Diversity_infographic.pdf

Riegle-Crumb, C., King, B., & Irizarry, Y. (2019). Does STEM stand out? Examining racial/ethnic gaps in persistence across postsecondary fields. *Educational Researcher, 48*(3), 133–144. https://doi.org/10.3102/0013189X19831006

Rogge, K. (1990, December 29). Higher ambition: Fort Worth test program aims to push minority students into tougher math classes. *Fort Worth Star-Telegram*, 23.

Rose, H., & Betts, J. R. (2004). The effect of high school courses on earnings. *The Review of Economics and Statistics, 86*(2), 497–513. http://www.jstor.org/stable/3211643

Scavella, A. J. (1970). On the mathematics curriculum in Black colleges. *The American Mathematical Monthly, 77*(3), 297–298. https://doi.org/10.1080/00029890.1970.11992476

Seymour, E., & Hunter, A.-B. (Eds.). (2019). *Talking about leaving revisited: Persistence, relocation, and loss in undergraduate STEM education.* Springer. https://doi.org/10.1007/978-3-030-25304-2

Smith, A. N. (2020). A dream deferred? An examination of Black education in the United States. *Journal of Underrepresented and Minority Progress, 4*(1), 44–64. https://ojed.org/jump/article/view/1239/976

Smith, T. M., & Choy, S. P. (1995). *High school students ten years after 'A Nation at Risk.'* National Center for Education Statistics. https://nces.ed.gov/pubs95/95764.pdf

Smith, W. M., Voigt, M., Ström, A., Webb, D. C., & Martin, W. G. (Eds.). (2021). *Transformational change efforts: Student engagement in mathematics through an institutional network for active learning.* American Mathematical Society. https://www.ams.org/books/mbk/138/mbk138-endmatter.pdf

Snipes, V. T., & Waters, R. D. (2005). The mathematics education of African Americans in North Carolina: From the Brown decision to No Child Left Behind. *The Negro Educational Review, 56*(2–3), 107–126. https://www.researchgate.net/publication/234761220_The_Mathematics_Education_of_African_Americans_in_North_Carolina_From_the_Brown_Decision_to_No_Child_Left_Behind

Sonnert, G., & Sadler, P. M. (2014). The impact of taking a college pre-calculus course on students' college calculus performance. *International Journal of Mathematical Education in Science and Technology, 45*(8), 1188–1207. https://doi.org/10.1080/0020739X.2014.920532

Sowell, T. (1974). Black excellence—the case of Dunbar High School. *The Public Interest, 35* 3–21. https://www.nationalaffairs.com/storage/app/uploads/public/58e/1a4/ba6/58e1a-4ba616e4230354245.pdf

Standish, H. A. (2006). *A case study of the voices of African American teachers in two Texas communities before and after desegregation, 1954 to 1975* [Unpublished doctoral dissertation]. Texas A&M University. https://oaktrust.library.tamu.edu/server/api/core/bitstreams/e6211b7e-a93a-4df9-af87-85d4d432addd/content

Steen, L. A. (1999). Algebra for all in eighth grade: What's the rush? *Middle Matters, 8*(1), 1, 6–7. http://www.steen-frost.org/Steen/Papers/99algebra.html

Stiff, L. V., & Harvey, W. B. (1988). On the education of Black children in mathematics. *Journal of Black Studies, 19*(2), 190–203. https://journals.sagepub.com/doi/10.1177/002193478801900206

Scurlock Studio Records. (1950). *Mrs. Lewis class room [sic] Garnet Patterson Jr. High* [Photograph]. Smithsonian Online Virtual Archives. https://sova.si.edu/record/nmah.ac.0618.s04.06/ref27432?s=0&n=10&t=A&q=Garnet-Patterson+Junior+High+School&i=2

The Algebra Project. (n.d.). *Who we are.* https://algebra.org/who-we-are/

The Young People's Project. (n.d.). https://www.typp.org/

Thomas, G. E. (1988). Black higher education in the 1970s and 1980s: Affirmative action implications. *Educational Policy, 2*(2), 137–155. https://doi.org/10.1177/0895904888002002003

Toritto, A. J. (2022). Finding human rights in higher education: A history of federal financial aid and discrimination in the United States. *Of Life and History, 3*. https://crossworks.holycross.edu/oflifeandhistory/vol3/iss1/4

Treisman, U. (1992). Studying students studying calculus: A look at the lives of minority mathematics students in college. *The College Mathematics Journal, 23*(5), 362–372. https://doi.org/10.2307/2686410

Tucker, A. (2013). The history of the undergraduate program in mathematics in the United States. *The American Mathematical Monthly, 120*(8), 689–705. https://doi.org/10.4169/amer.math.monthly.120.08.689

Tugend, A. (2017, September 7). Who benefits from the expansion of A.P. classes? *The New York Times Magazine.* https://www.nytimes.com/2017/09/07/magazine/who-benefits-from-the-expansion-of-ap-classes.html

U.S. Bureau of the Census. (1976). *School enrollment—social and economic characteristics of students: October 1975.* U.S. Government Printing Office. https://www.census.gov/content/dam/Census/library/publications/1976/demo/p20-303.pdf

U.S. Census Bureau. (2023). *Figure A-5a. High school graduates aged 18 to 24 enrolled in college by race: 1967 to 2022.* https://www.census.gov/content/dam/Census/library/visualizations/time-series/demo/school-enrollment/FigureA-5a_2022.pdf

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, & National Assessment of Educational Progress. (Various years, 1986–2023). *NAEP long-term trend assessment results: Reading and mathematics.* https://www.nationsreportcard.gov/ltt/mathematics/student-experiences/?age=13

U.S. Department of Education, National Center for Education Statistics. (2019). *Data Point: Algebra I coursetaking and postsecondary enrollment.* https://nces.ed.gov/pubs2019/2019154.pdf

U.S. Department of Education, Office for Civil Rights. (n.d.). *2021–22 civil rights data collection.* https://www.ed.gov/sites/ed/files/about/offices/list/ocr/docs/2021-22-crdc-school-form.pdf

U.S. Department of Education, Office for Civil Rights. (2024). *Student access to and enrollment in mathematics, science, and computer science courses and academic programs in U.S. public schools.* 2020–2021 civil rights data collection. https://www.ed.gov/sites/ed/files/about/offices/list/ocr/docs/crdc-student-access-enrollment.pdf

U.S. Department of Education, Office for Civil Rights. (2025a). *A first look: Students' access to educational opportunities in U.S. public schools.* 2021–2022 civil rights data collection. https://www.ed.gov/media/document/2021-22-crdc-first-look-report-109194.pdf

U.S. Department of Education, Office for Civil Rights. (2025b). *Data on equal access to education.* 2020–2021 civil rights data collection. https://civilrightsdata.ed.gov/

U.S. Department of Education, Office for Civil Rights. (2025c). *Data spotlight: View state profiles.* 2020–2021 civil rights data collection. https://civilrightsdata.ed.gov/view

Volić, I. (2024). *Making democracy count: How mathematics improves voting, electoral maps, and representation.* Princeton University Press. https://doi.org/10.2307/jj.7492228

Wainstein, L., Miller, C. E., Phillips, M., Yamashiro, K., & Melguizo, T. (2023). *Twelfth grade math and college access.* Los Angeles Education Research Institute. https://laeri.luskin.ucla.edu/wp-content/uploads/sites/22/2022/12/LAERITwelfthGradeMathandCollegeAccessReport121522.pdf

Walker, V. S. (1996). *Their highest potential: An African American school community in the segregated South.* The University of North Carolina Press. https://uncpress.org/9780807845813/their-highest-potential/

Williams, B. (2025, January 6). *Math Makes Movement: The national math literacy campaign takes root.* Florida International University, Bob Moses Center. https://mosescenter.fiu.edu/news-events/2025/math-makes-movement-the-national-math-literacy-campaign-takes-root.html#:~:text=As%20the%20South%20Florida%20anchor%2C%20the%20Bob,already%20launched%20a%20series%20of%20dynamic%20events

Williams, L. (1974, November 6). Black parent leads the fight against class grouping. *The News and Observer*, 38.

Wondwossen, W. (2020). *The science behind HBCU success.* National Science Foundation. https://www.supremecourt.gov/opinions/URLs_Cited/OT2022/20-1199/20-1199-4.pdf

Wyoming State Archives. (2014). *Dr. Willie Black, chancellor of the Black Student Alliance in 1969, on the Black 14.* WyoHistory.org. https://www.wyohistory.org/oral-histories/dr-willie-black-chancellor-black-student-alliance-1969-black-14

Zhorov, I. (2016, November 4). Why Sputnik's signal still reverberates in U.S. classrooms. *WHYY*. https://whyy.org/segments/why-sputniks-signal-still-reverberates-in-us-classrooms/