An Alternative to Middle School Acceleration

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Agenda

- Introductions
  - Name, Role, Location
- Why do we accelerate in middle school?
  - Should we?
- What is the alternative?
- Who has done it and how?
  - Was is successful?
- When should we change course?

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Why do we Accelerate in Middle School?

For decades, the majority of districts

In NY have been accelerating in

MIDDLE SCHOOL,

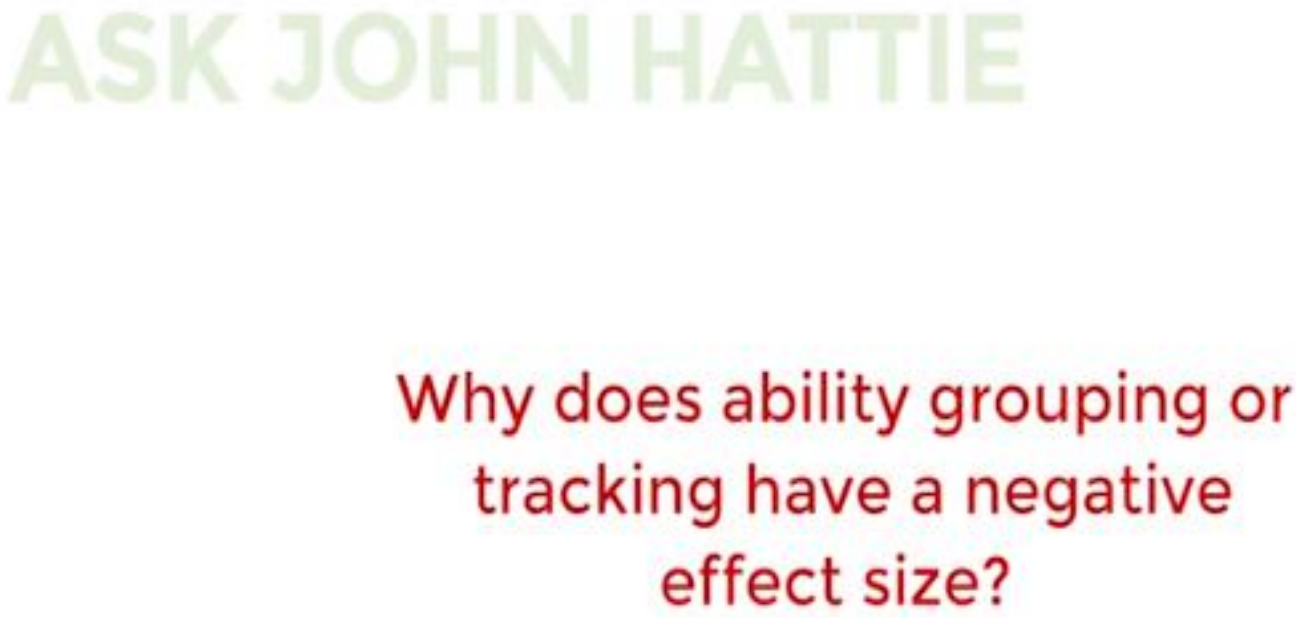
in grade 7 or 8, due to a

perceived redundancy of the content in middle school mathematics.

Tracking vs Acceleration

Why shouldn’t we “track” students in Middle School?

John Hattie



Meta-studies show that tracking students has close to zero impact on students achievement (Hattie).

WE MUST NOT TOLERATE ACTS OF RACISM, HATE, BIAS, OR VIOLENCE.

NCTM®

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

Key Recommendation

High school mathematics should discontinue the practice of tracking teachers as well as the practice of tracking students into qualitatively different or dead-end course pathways.

NCTM. (2018). *Catalyzing change in high school mathematics: Initiating critical conversations.* Reston, VA: NCTM.

Growth Mindset

- Tracking that puts students into qualitatively different course pathways, where some students have access to mathematics instruction that prepares them for postsecondary education opportunities and others do not, reinforces the misguided notion that only some people are capable of achieving in mathematics. (Boaler 2011)

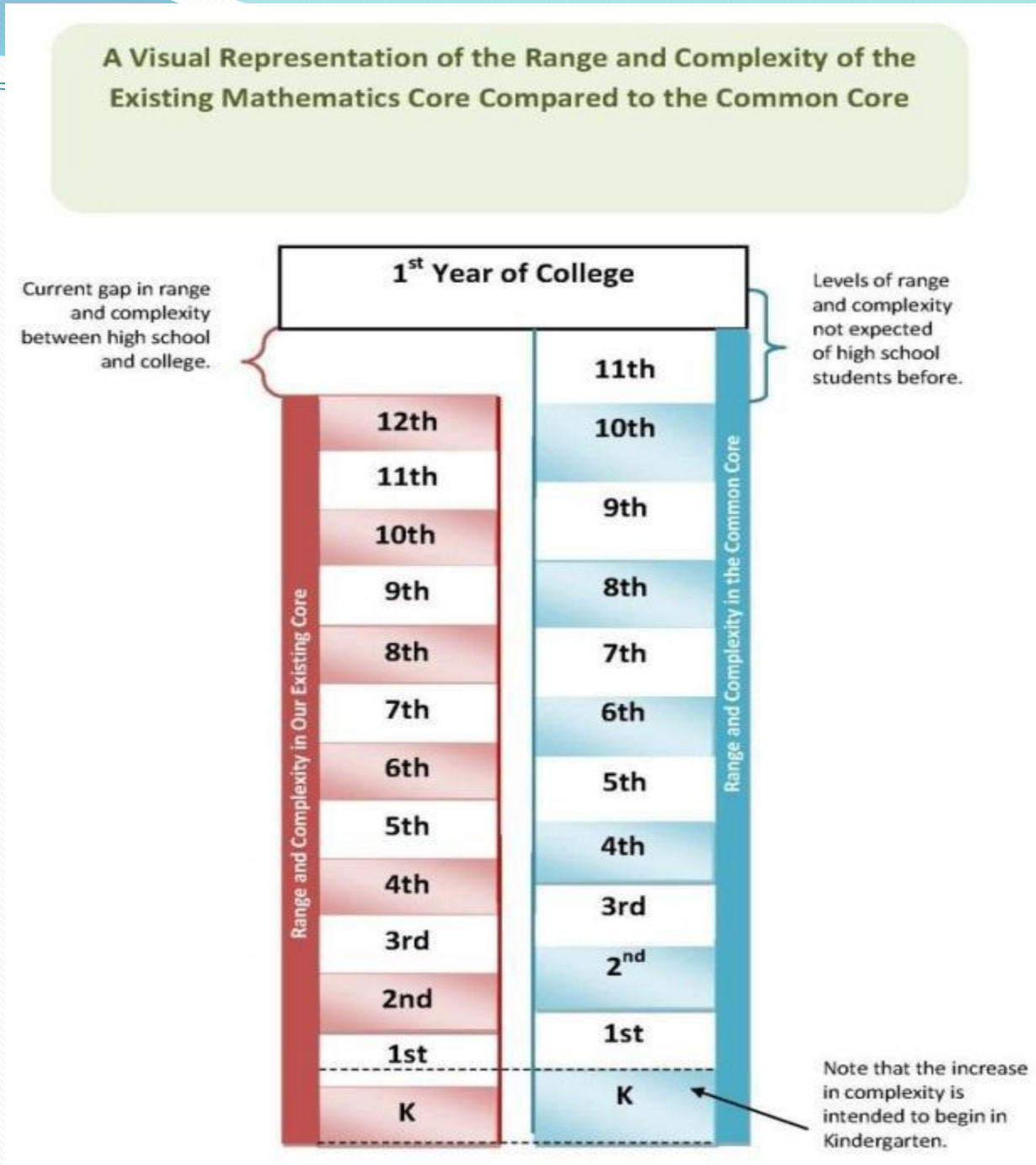
Why shouldn't we Accelerate students in Middle School?

- This is not your mother's algebra course!
  - Standards have changed.
- Middle school content is the foundation for high school mathematics, college and career.
  - This is the content that should NOT be rushed!
- Longitudinal studies show that placing students in Algebra in grade 8 prior to demonstrating readiness has a negative impact
  - Zseller, 2014
  - Duke, 2013

Standards have changed…

Expectations have changed.

A Shift:


A Visual Representation of the Range and Complexity of the Existing Mathematics Core Compared to the Common Core
1st Year of College
Current gap in range and complexity between high school and college.
Levels of range and complexity not expected of high school students before.
Range and Complexity in Our Existing Core
Range and Complexity in the Common Core
12th
11th
10th
9th
8th
7th
6th
5th
4th
3rd
2nd
1st
K
11th
10th
9th
8th
7th
6th
5th
4th
3rd
2nd
1st
K
Note that the increase in complexity is intended to begin in Kindergarten.

2005 Algebra 2/Trig Standards – *Moved!*

P and C, Trig

Rational and Irrational Expressions
Logarithms and *e*, Trigonometry

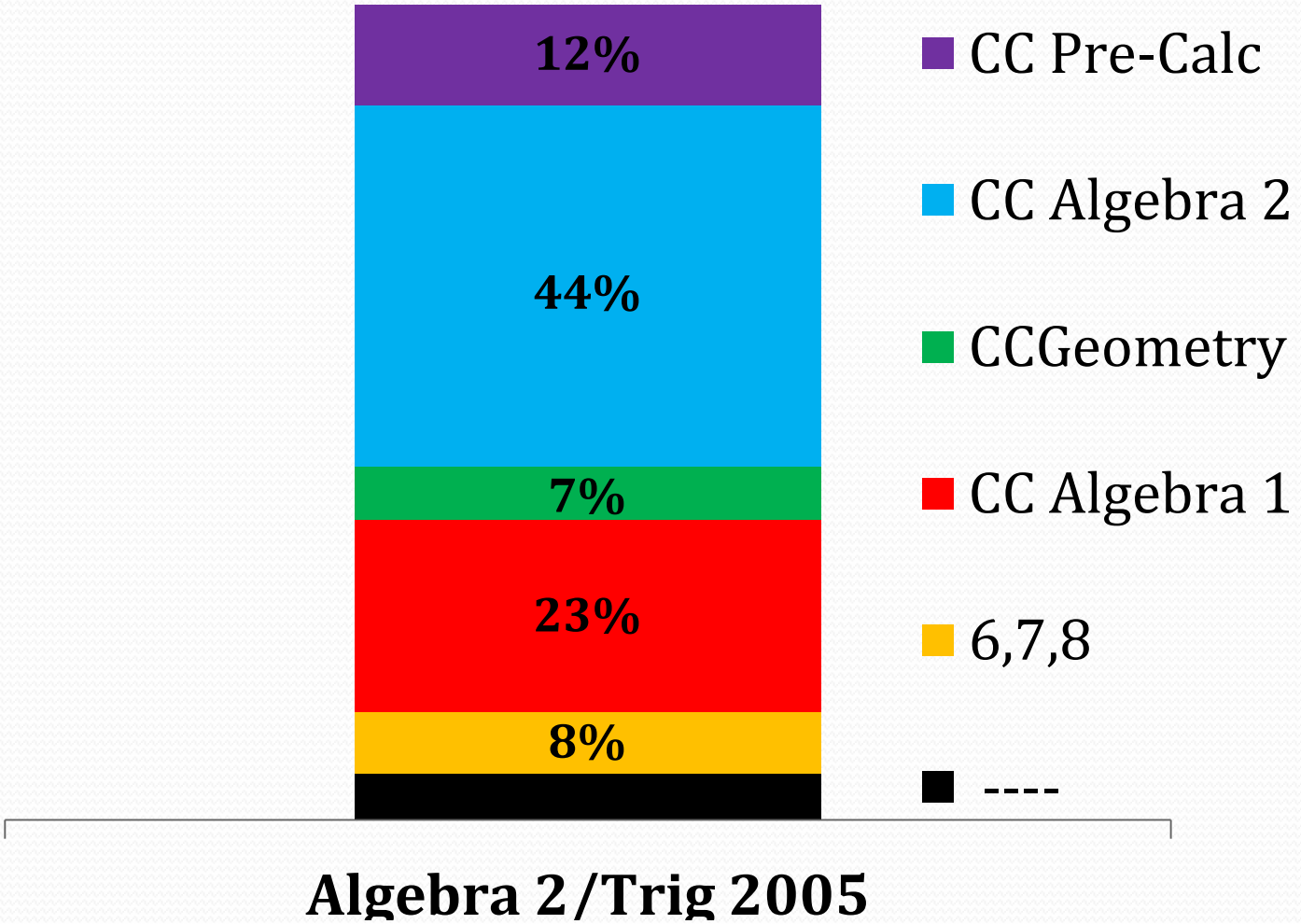
Circles, Triangle Trig

Sequences, Functions, Quadratics

Expon/Rads, Statistics
De-Emphasized

Algebra 2/Trig 2005

2005 Algebra 2/Trig Standards – *Moved!*



Integrated Algebra – *Where did it go?*

Rational Expressions
Sets

Triangle Trig

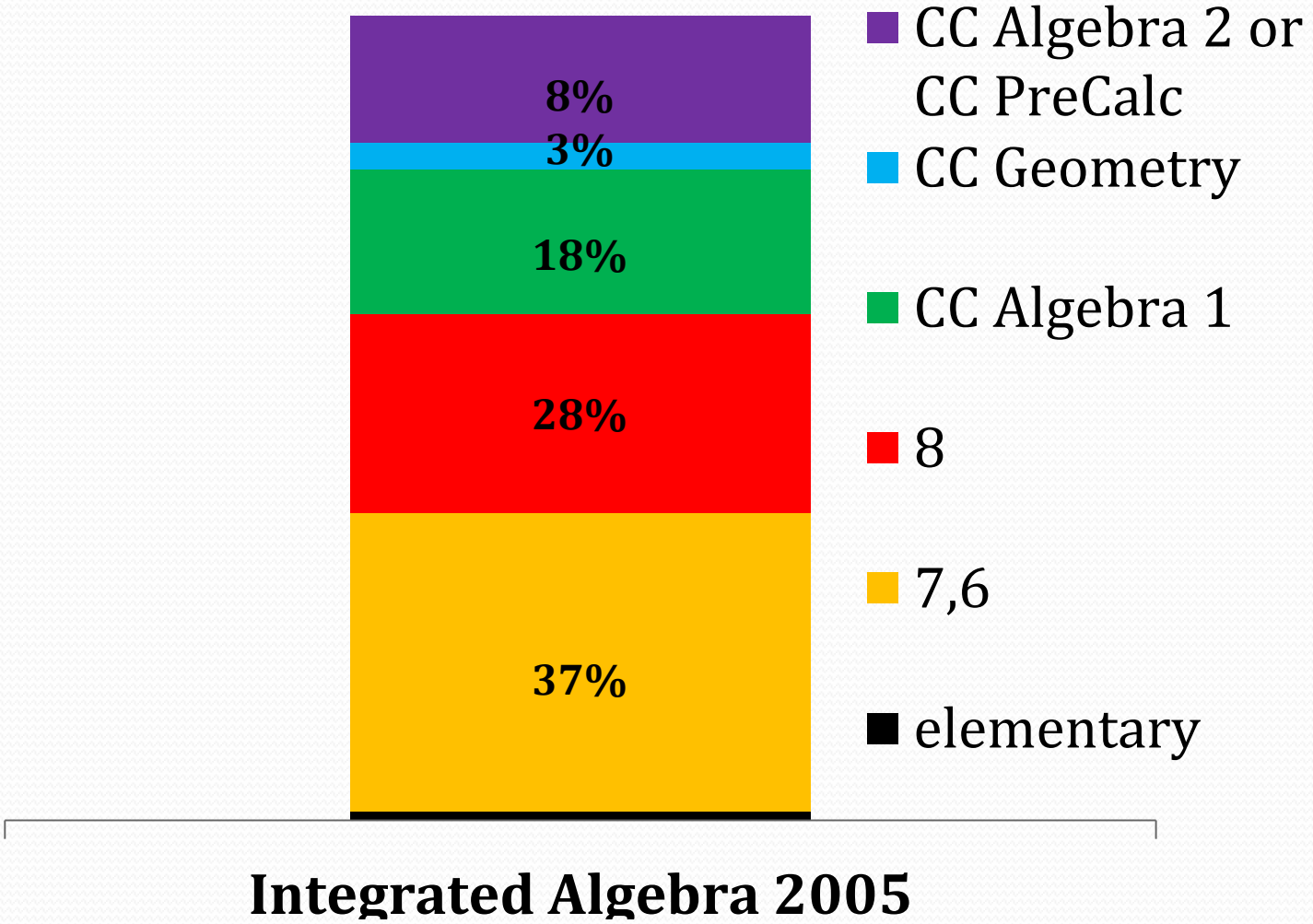
Quadratics

Linear Algebra
Bivariate Stats

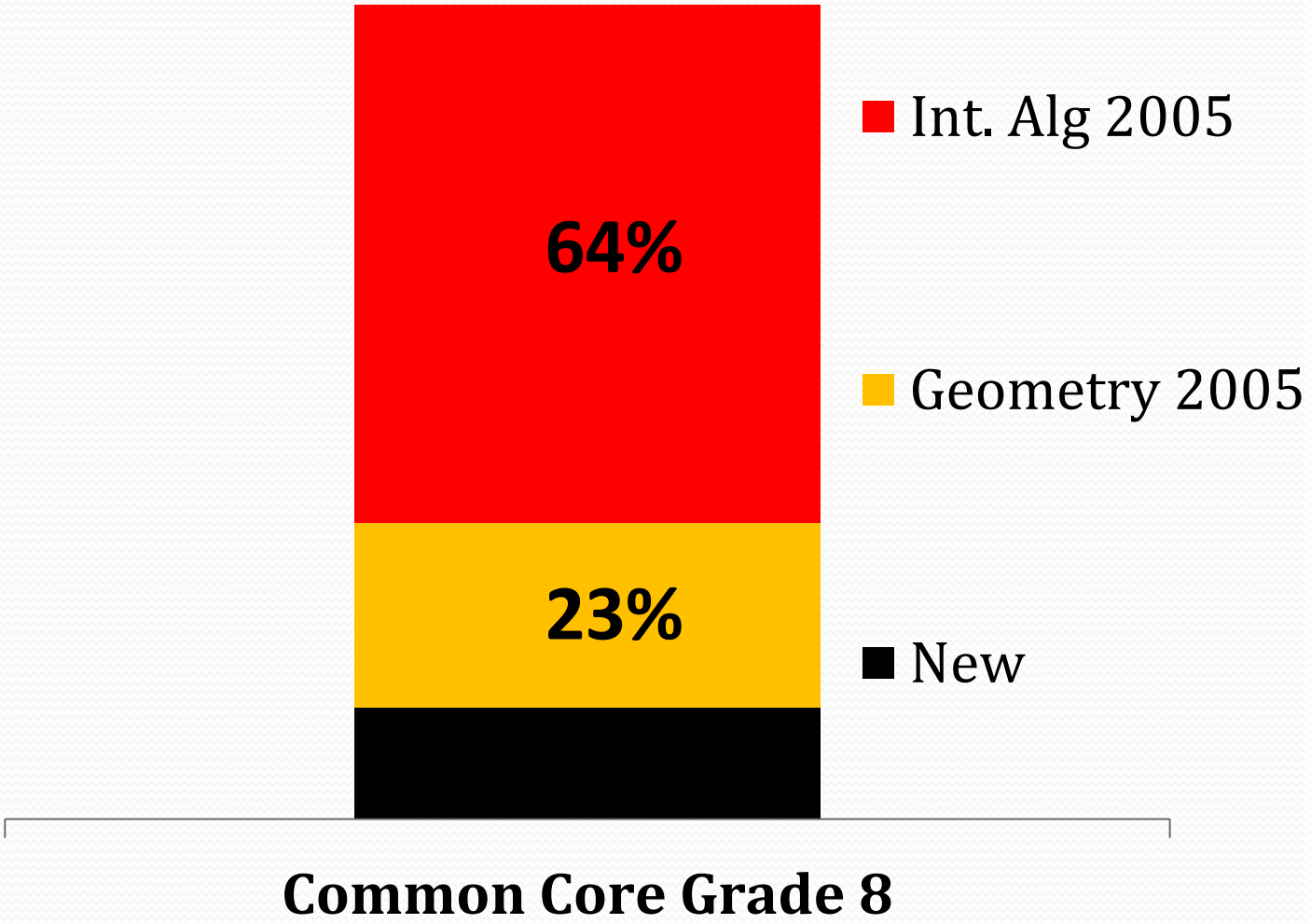
Expressions,
Equations,
Inequalities,
Prob/Stats

Integrated Algebra 2005

Integrated Algebra – *Where did it go?*



Common Core Grade 8 – *What is it?*



ACT.org

- *Top 20 Topics Rated Most Important as Prerequisites by Instructors of Credit-Bearing First-Year College Mathematics Courses:*

Top 20 Topics

Rank	Topic	Typically taught in
1	Evaluate algebraic expressions	Algebra I (and CC8)
2	Perform addition, subtraction, multiplication, and division on signed rational numbers	grade 7 or earlier
3	Solve linear equations in one variable	Algebra I (Now CC8)
4	Solve multistep arithmetic problems	grade 7 or earlier
5	Locate points on the number line	grade 7 or earlier

Top 20 Topics

Rank	Topic	Typically taught in
6	Perform operations (add, subtract, multiply) on linear expressions	Algebra I (Now CC8)
7	Find the slope of a line	Algebra I (Now CC8)
8	Find equivalent fractions	grade 7 or earlier
9	Find and use multiples and factors	grade 7 or earlier
10	Perform operations (add, subtract, multiply) on polynomials	Algebra I

Top 20 Topics

Rank	Topic	Typically taught in
11	Locate points in the coordinate plane	grade 7 or earlier
12	Write expressions, equations, or inequalities to represent mathematical and real-world settings	Algebra I (and CC8)
13	Evaluate functions at a given value of x	Algebra I (and CC8)
14	Graph linear equations in two variables	Algebra I (Now CC8)
15	Order rational numbers	grade 7 or earlier

Top 20 Topics

Rank	Topic	Typically taught in
16	Determine the absolute value of rational numbers	grade 7 or earlier
17	Manipulate equations and inequalities to highlight a specific unknown	Algebra I
18	Manipulate expressions containing rational exponents	Algebra II
19	Solve linear inequalities in one variable	Algebra I (Now CC8)
20	Solve problems using ratios and proportions	grade 7 or earlier

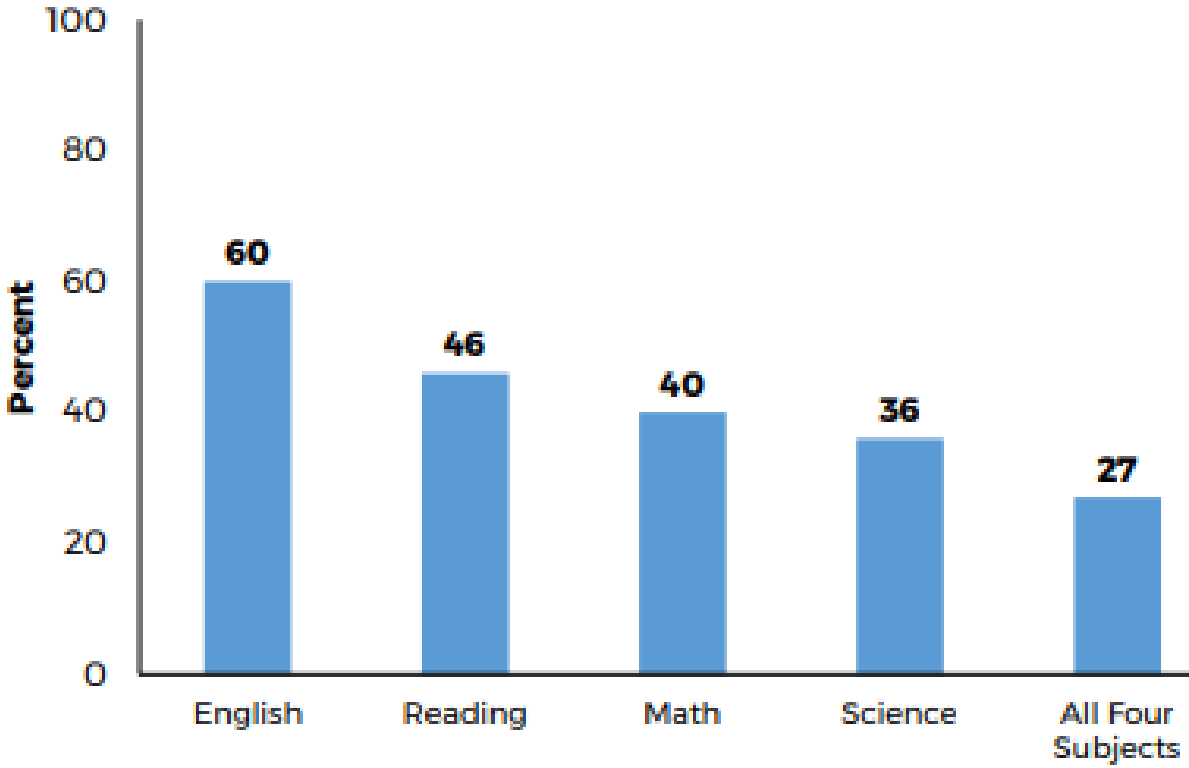
The vast majority of math topics rated as the most important pre-requisites for college readiness are taught in middle school grades 6, 7, and 8.

ACT – 2018 Cohort

Attainment of College and Career Readiness

- 1,914,817 high school graduates, or an estimated 55% of the 2018 graduating class, took the ACT*.
- Between 2014 and 2018, the number of students taking the ACT nationally increased by 69,030 students (4 percent).

Percent of 2018 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Subject

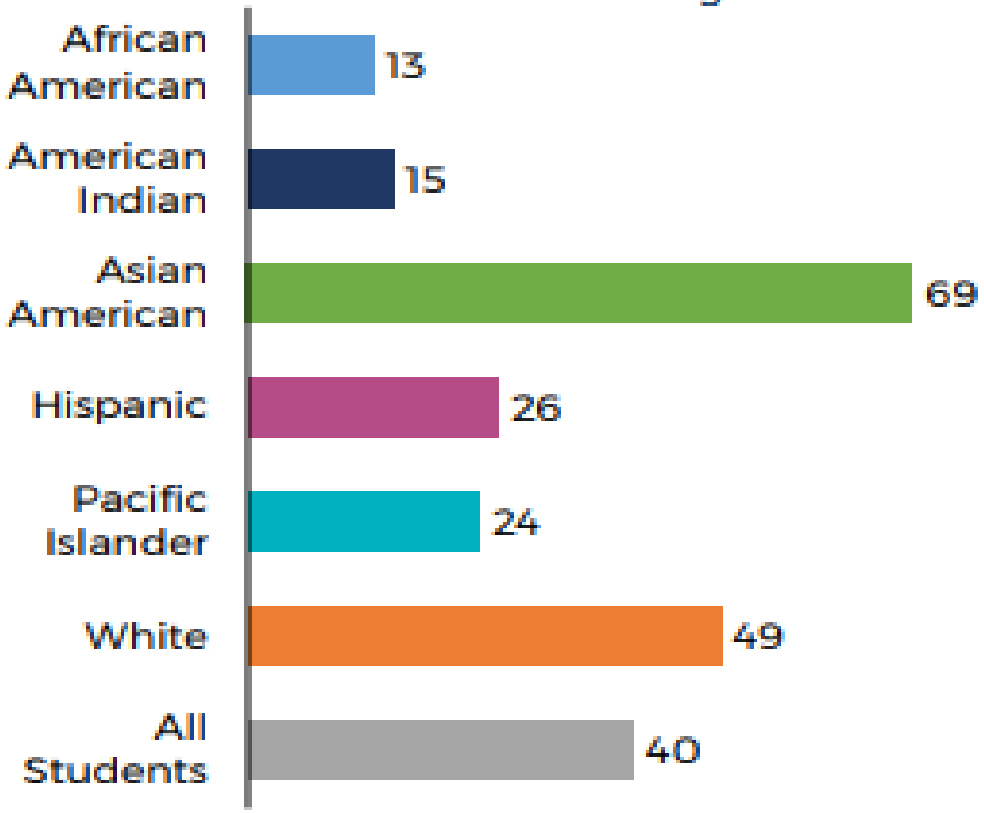


ACT - 2018

Participation and Opportunity by Subject

Math

Percent of 2018 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject



What About Careers?

- Calculus in the workforce?
  - Physicists
  - Engineers
- Statistics in the workforce?
  - All Sciences
  - Research and Development
  - Business
  - Marketing and Advertising
  - Wall Street
  - Education
  - Consumers and Citizens……

MAA and NCTM Joint Statement

The goal of a K-12 mathematics curriculum shouldn't be to get students through *calculus* but to give students a **strong foundation** in mathematics that will prepare them for a range of college majors.

Algebra in 8?

- “Many communities are finding that students who start Algebra early do not necessarily end up studying more mathematics.”

  ~Cathy L. Seeley, Past President NCTM

Was it working?

Level 2 Students were *more successful* in Integrated Algebra in a Traditional Program than in an Accelerated Program

2012 Integrated Algebra Success Rates By Grade Seven Year			
Grade 7 Level	**7th in 2009 Extended Students**	**7th in 2010 Traditional Students**	**7th in 2011 Accelerated Students**
1		**28.1%**	**28.6%**
2L	**25.8%**	**55.5%**	**43.1%**
2H	**46.9%**	**80.4%**	**70.4%**
3L	**65.9%**	**91.6%**	**91.2%**
3H	**87.0%**	**97.2%**	**98.2%**
4L	**99.7%**	**99.6%**	**100%**
4H			

Was it working?

Students Who Scored Level 1 or Level 2L in Grade 7
Did NOT Take Geometry as Accelerated Students

2013 Geometry Success Rates By Grade Seven Year			
Grade 7 Level	7th in 2009 Extended Students	7th in 2010 Traditional Students	7th in 2011 Accelerated Students
1			
2L		47.4%	
2H		65.4%	63.5%
3L	55.3%	85.8%	83.7%
3H	79.2%	93.3%	94.3%
4L	97.4%	98.1%	99.4%
4H			100%

Was it working?

Students in an Accelerated Program are not as Successful as Students in a Traditional Program in Algebra II/Trig

2014 Algebra II / Trig Success Rates by Grade 7 Year			
Grade 7 Level	**2009 Extended Students**	**2010 Traditional Students**	**2011 Accelerated Students**
1			
2L		40.5%	
2H		56.7%	37.3%
3L		68.6%	59.7%
3H		78.6%	77.9%
4L		88.2%	94.8%
4H			100%

Duke University Study, 2013

- "… students who were pushed to take algebra by 8th grade performed less well in subsequent math courses, especially geometry, as they progressed through high school."

MAA and NCTM

- The United States has fallen into a seriously dysfunctional system for preparing students for careers in science and engineering, guaranteeing that all but the very best rush through essential parts of the mathematics curriculum and then are forced to sit and spin their wheels while they try to compensate for what was missed. It will take time and work by all involved to repair the transition from high school to college. We cannot afford to wait.

NCTM Catalyzing Change 2018

The Purpose of School Mathematics:

- Expand professional Opportunity
- Understand and Critique the World
- Experience Wonder, Joy and Beauty

NCTM: Call to Change

- De-Track Students and Teachers
- Classroom instruction should be consistent with research-based equitable teaching practices
- High schools should offer continuous four year pathways
  - **two or three years in a common pathway**.

Common Core Learning Standards

Date		Grade 9 -- Algebra I	Grade 10 -- Geometry	Grade 11 -- Algebra II	Grade 12 -- Precalculus
9/6/12	20 days	M1: Relationships Between Quantities and Reasoning with Equations and Their Graphs (40 days)	M1: Congruence, Proof, and Constructions (45 days)	M1: Polynomial, Rational, and Radical Relationships (45 days)	M1: Complex Numbers and Transformations (40 days)
10/10/12	20 days				
11/8/12	20 days	M2: Descriptive Statistics (25 days)	M2: Similarity, Proof, and Trigonometry (45 days)	M2: Trigonometric Functions (20 days)	M2: Vectors and Matrices (40 days)
12/11/12	20 days	M3: Linear and Exponential Functions		M3: Functions (45 days)	
1/17/13	20 days	State Examinations (35 days)	State Examinations	State Examinations	State Examinations
2/15/13	20 days	M4: Polynomial and Quadratic Expressions, Equations and Functions (30 days)	M3: Extending to Three Dimensions (10 days) M4: Connecting Algebra and Geometry through Coordinates (25 days)		M3: Rational and Exponential Functions (25 days) M4: Trigonometry (15 days)
3/22/13	20 days			M4: Inferences and Conclusions from Data (40 days)	
4/29/13	20 days	M5: A Synthesis of Modeling with Equations and Functions (20 days)	M5: Circles with and Without Coordinates (25 days)		M5: Probability and Statistics (30 days)
5/28/13	20 days	Review and Examinations	Review and Examinations	Review and Examinations	Review and Examinations

Detracking: Believing in the Brilliance of All Students

Angela Torres
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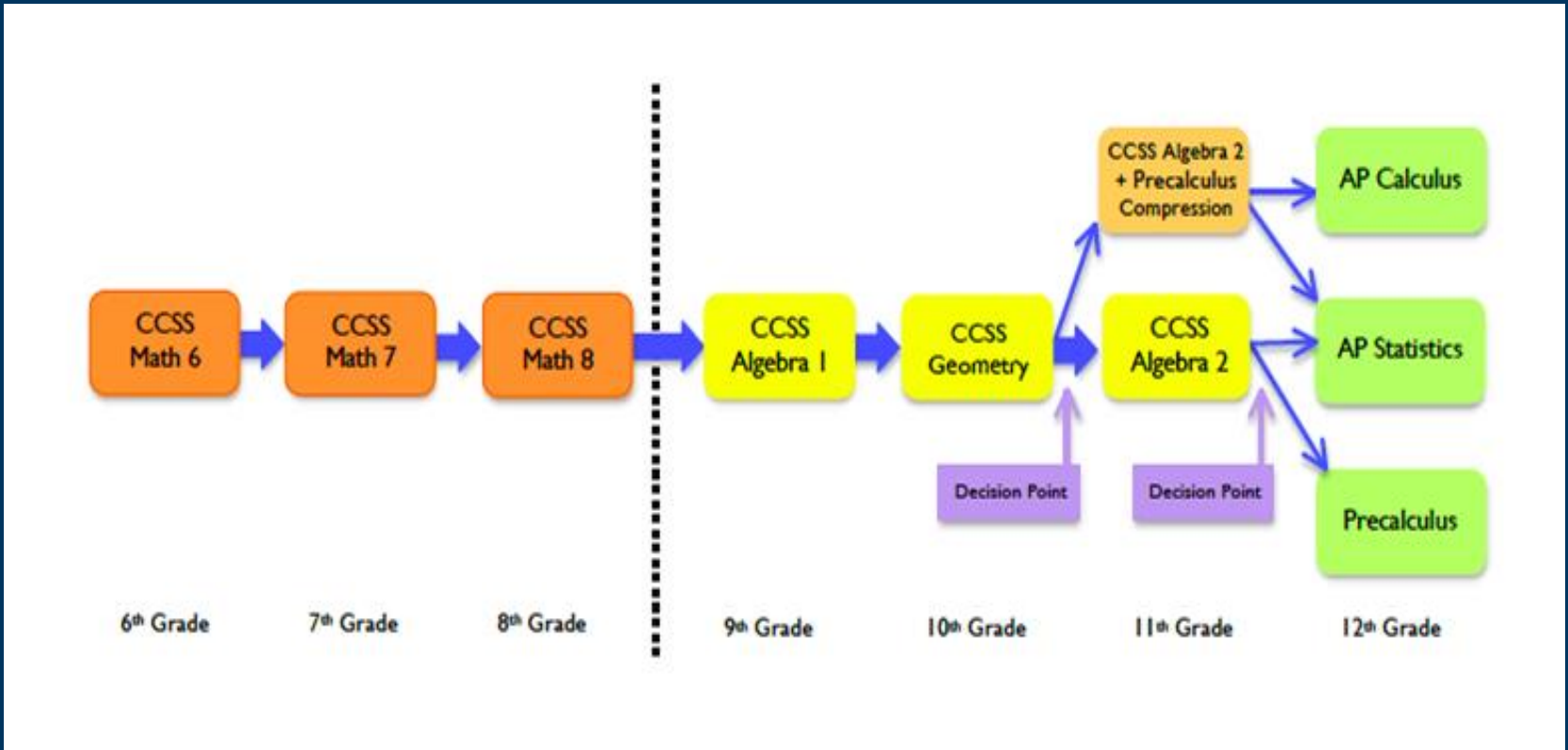
San Francisco USD
sfusdmath.org
@SFUSDMath

NCTM Leadership Conference
July 2020

Ho Nguyen

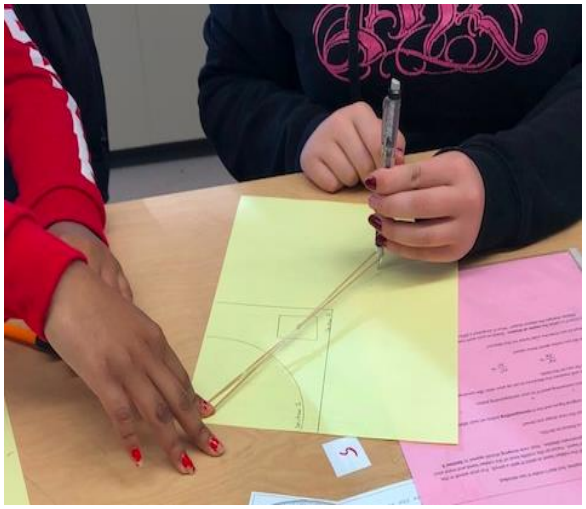
February 2014:
Passage of the **Math Course Sequence Policy**

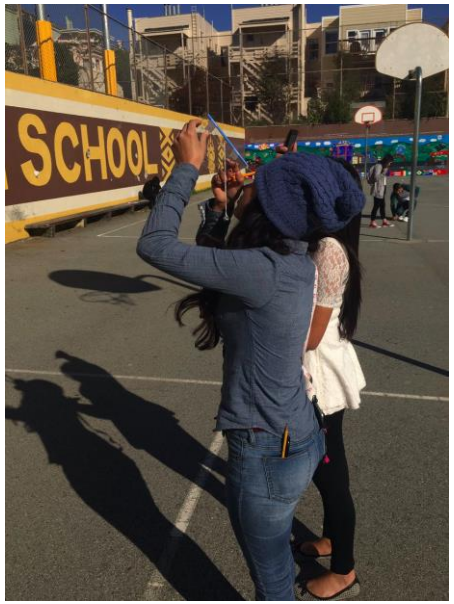


Drive from your Equity Vision

SFUSD Math Vision

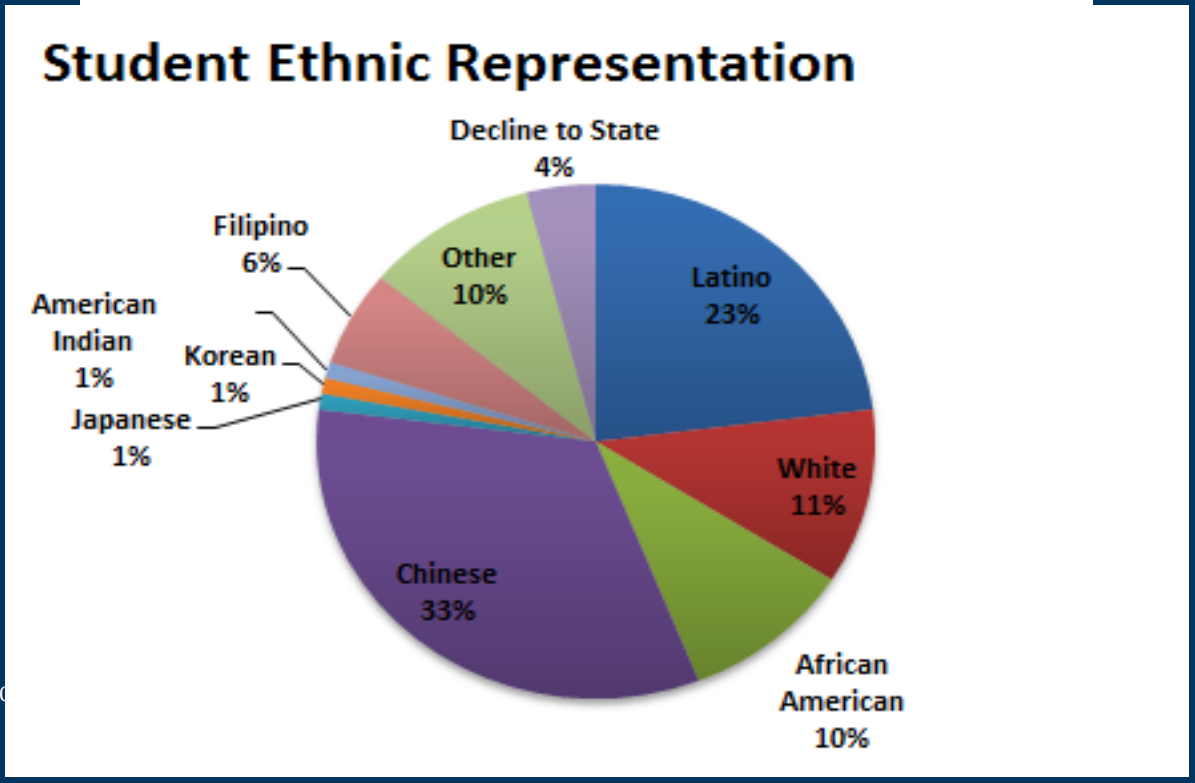
All students will make sense of rigorous mathematics in ways that are creative, interactive, and relevant in heterogeneous classrooms.



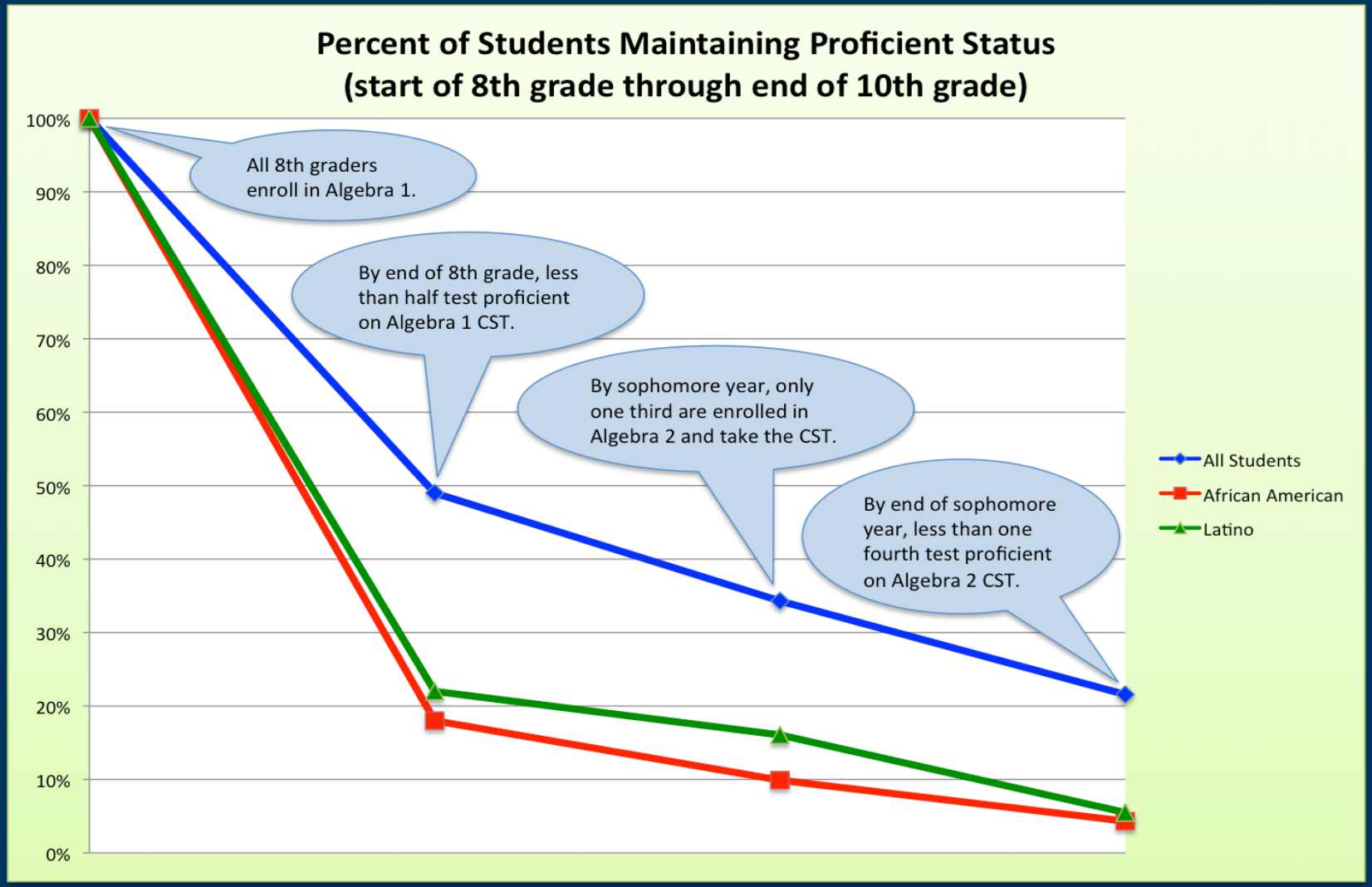


Current Data:
What is happening for your students?

Who are the 53,000 SFUSD students?

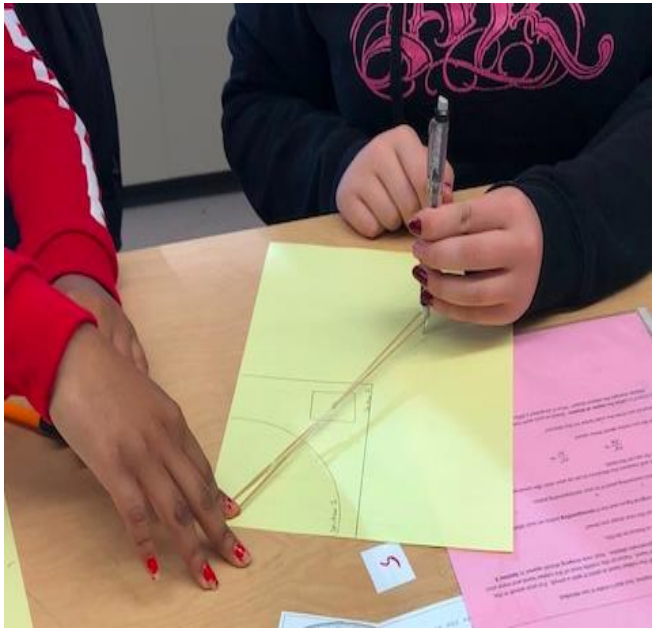


SFUSD Class of 2014



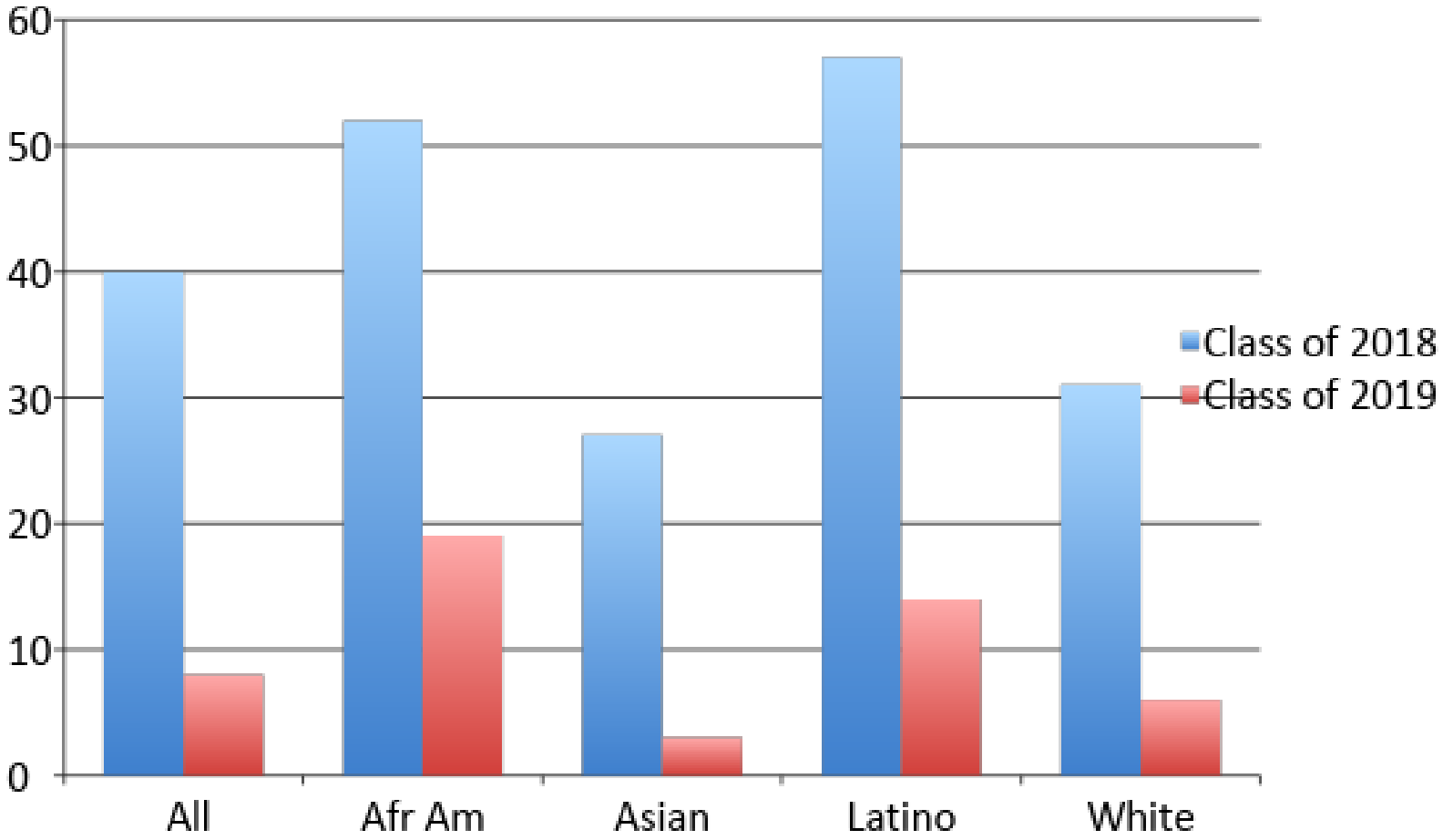
Levers of Change

- Policy
- Curriculum
- Coaching
- Professional Development

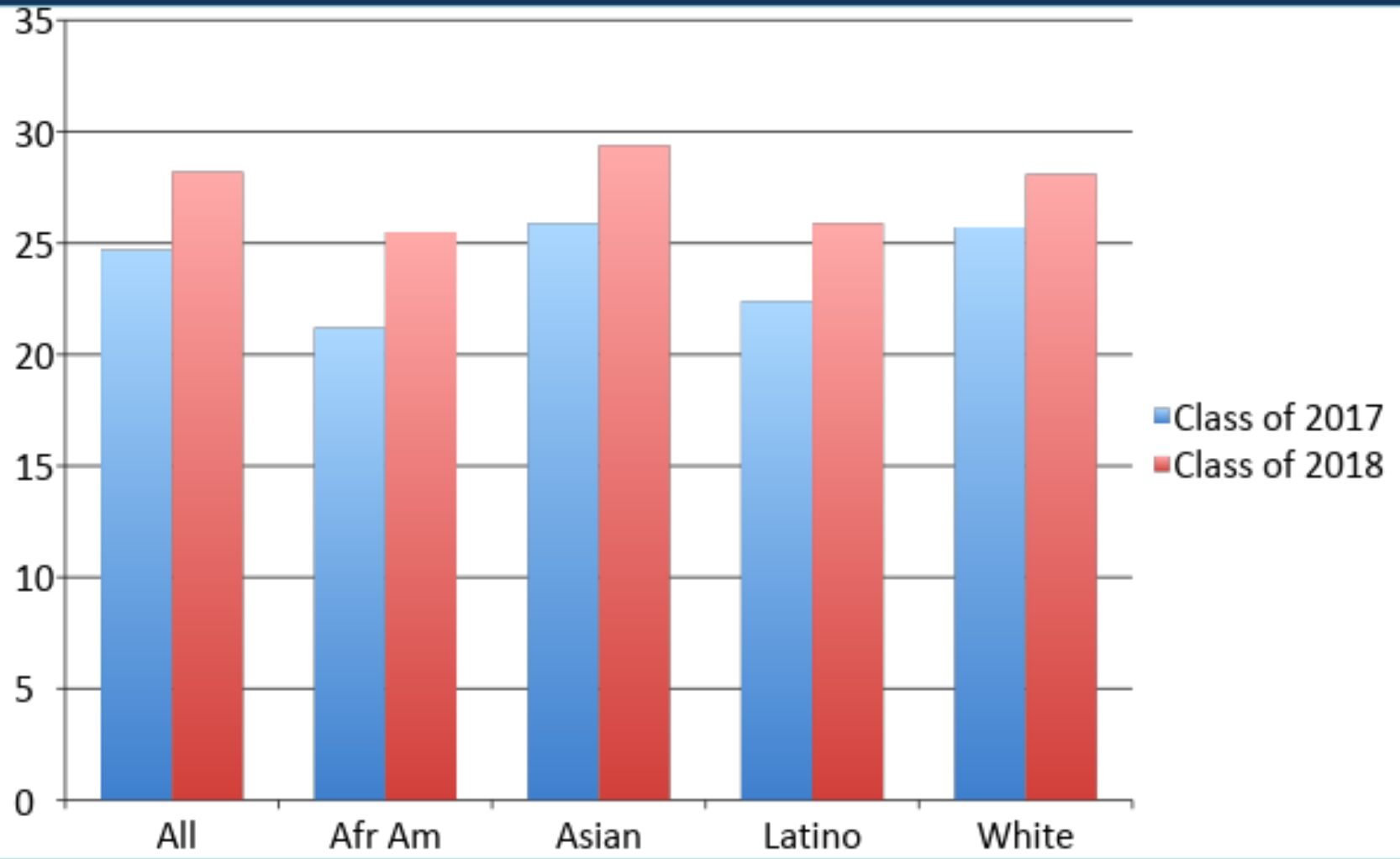


Data:
Now, what is the experience for students? For certain groups?

Algebra 1 Repeat Rate, Ethnicity

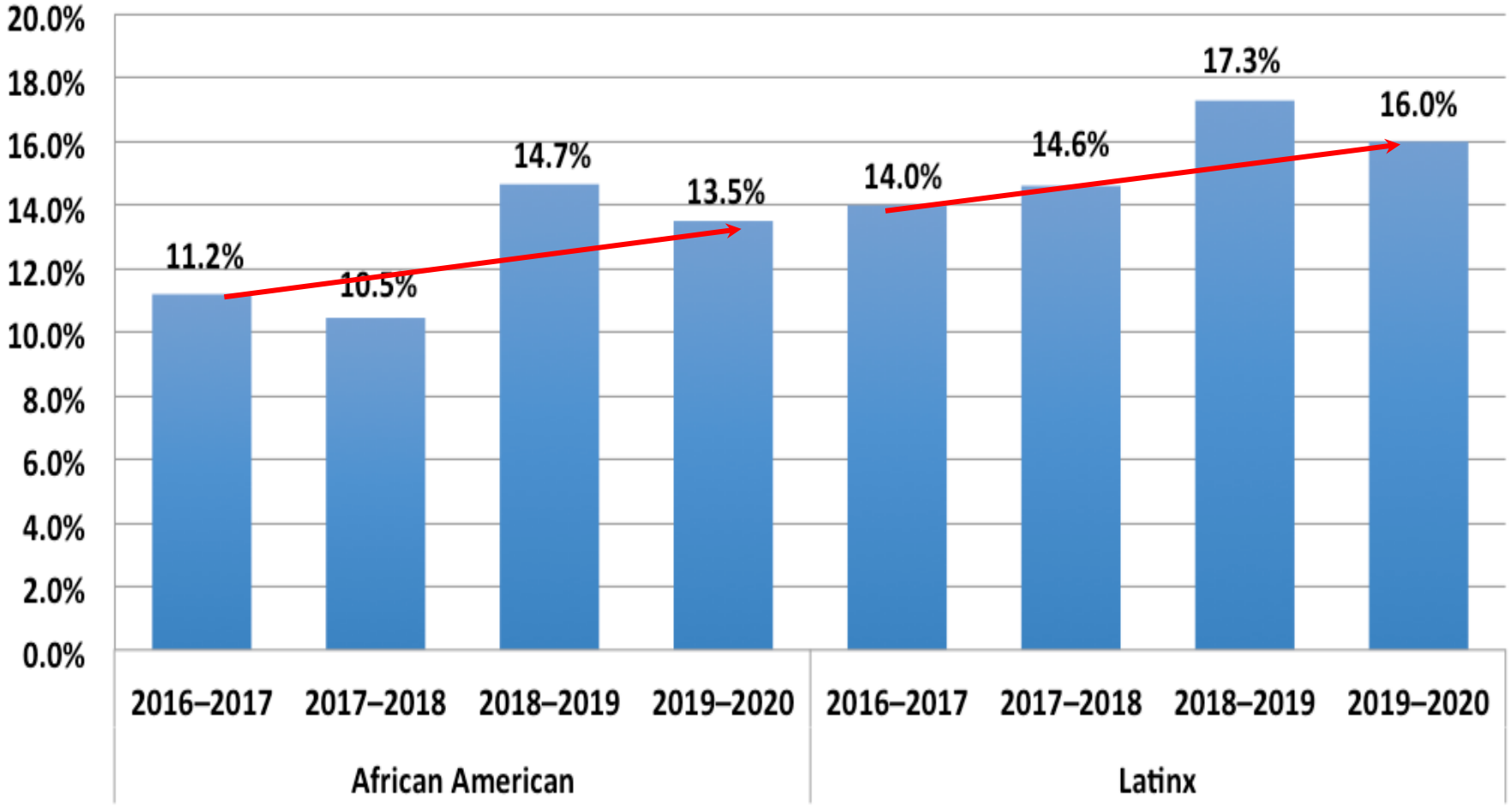


Increase in the amount of Math credits students have earned at the end of 11th grade, Ethnicity

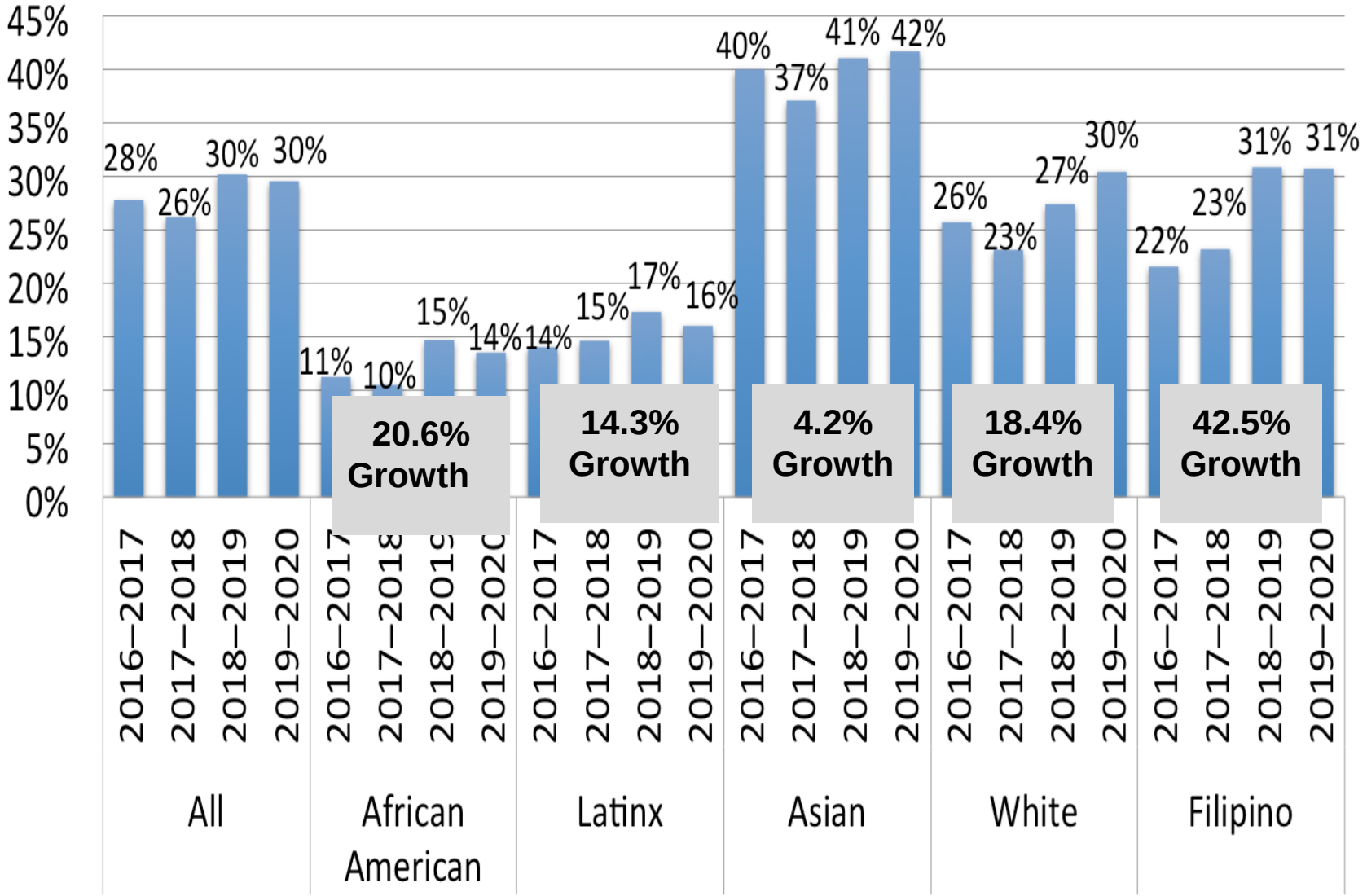


SFUSD

Percent of those in Advanced Math Courses (Beyond Alg 2) within the Total HS Enrollment of an Enthnic/ Racial Group



Percent of those in Advanced Math Courses (Beyond Alg 2) within the Total HS Enrollment of an Ethnic Group



SFUSD

“

While we cannot solve all the issues in our schooling system, we can understand how mathematics education plays a role in exacerbating or solving those problems. We can accept our responsibilities to acknowledge the disparities, act, and hold ourselves and each other accountable.

—TODOS,
The Mo(ve)ment to Prioritize Antiracist Mathematics

South Huntington Spotlight

- Huntington Station, Long Island
- 5,800 students
- 48% Latino, 37% White, 7% Black, 8% Other/Mixed
- 33% economically disadvantaged
- Dr. **Matthew Murphy**, Supervisor K-12 of Mathematics, Science, Technology, & Business Education.

South Huntington Spotlight

The “Why”

- 50% stayed in the accelerated program
- “Nice” kids were accelerated
- “Honors” is actually accelerated

South Huntington Spotlight

The approach: Two Decision Points:

- After 5th - 6H, 7H, A1
  - 7H is compacted one year, one period, fewer kids
- 2nd acceleration pathway in HS - 4 years in 3
  - After 8th - A1A, GA, A2A, Calc or Stats
    - College Calculus - SUNY Farmingdale
    - AP Calculus
    - AP Stats (growing in numbers)

- If you missed Algebra 1 Accelerated, there is summer work to enter program

South Huntington Spotlight

The Results

- More students in AP Stats and College Calculus
- Program is growing
- 97% stay in the program
- Students showing mathematical maturity
- “Not Honors Students” – Mathematical Identity

Reflection questions:

- How have these issues been exacerbated by the pandemic?
- What percent of your current students have learning gaps due to the pandemic?
- What long term effects do you think this pandemic will have on our students' learning?

The time is now

Detracking Resources

NCSM: Closing the Opportunity Gap: A Call to Detracking Mathematics (2020)
https://www.mathedleadership.org/docs/resources/positionpapers/NCSMPositionPaper19.pdf

Just Equations: Branching Out: Designing High School Pathways for Equity (2019) https://justequations.org/resource/branching-out-designing-high-school-math-pathways-for-equity/

NCTM Catalyzing Change (2018)
https://www.nctm.org/Supporting-Resources-Catalyzing-Change-in-High-School-Mathematics/

Thank YOU!

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