

# Rigorous Math Matters!

## 6/27/17

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# Introduction



**Christine Bailie, M.P. Aff**  
Deputy Director, P-16 Strategic Initiatives  
E3 Alliance

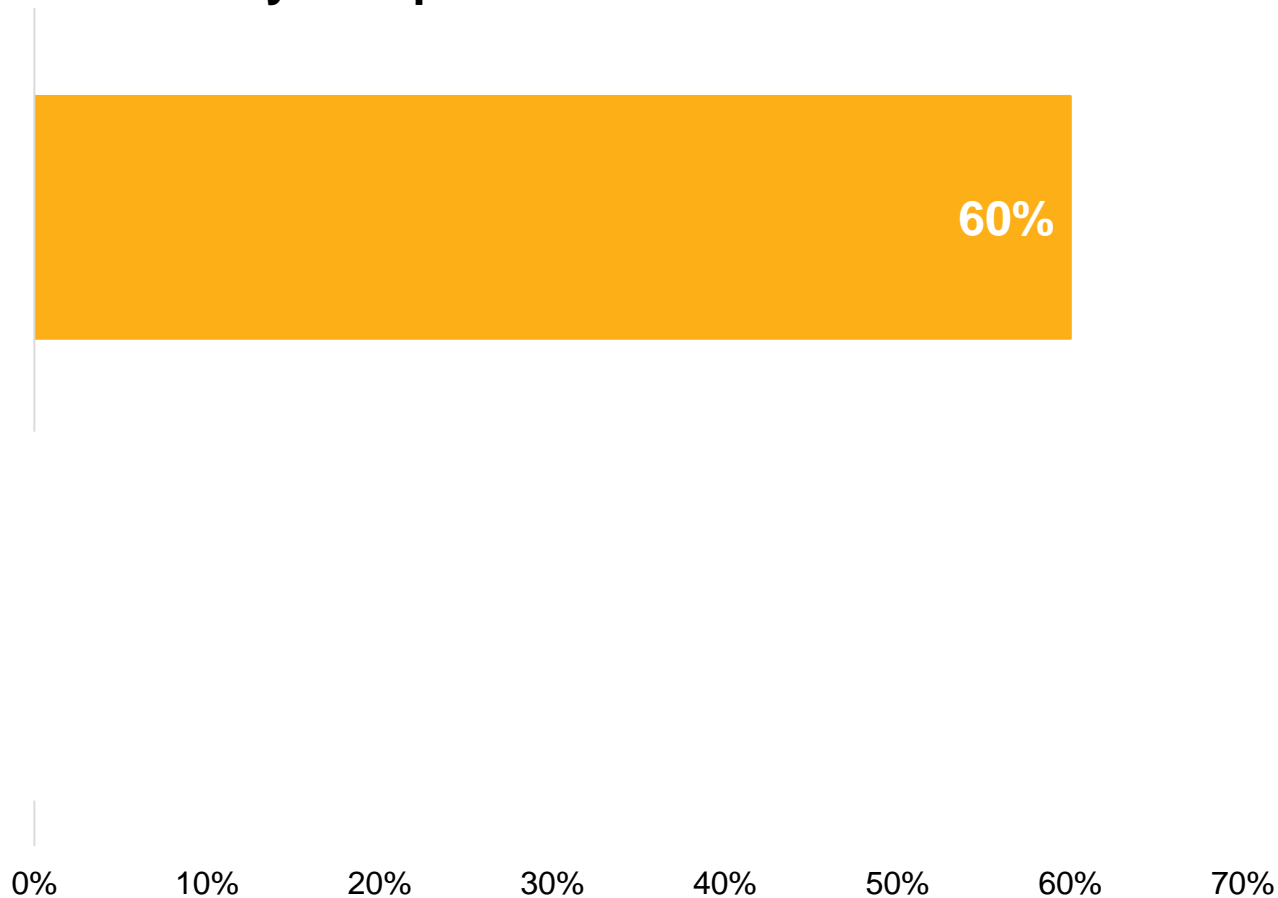
# Agenda

- I. Pipeline Imperative
- II. Postsecondary Success by Highest Math in High School
- III. Middle School Math Acceleration and Outcomes
- IV. Intersection of District Policies and College & Career Readiness
- V. Panel Presentation: Central Texas Case Study
- VI. Regional Priorities Across the State

# Texas Mandates 60% of Young Adults with College Degree by 2030, But...

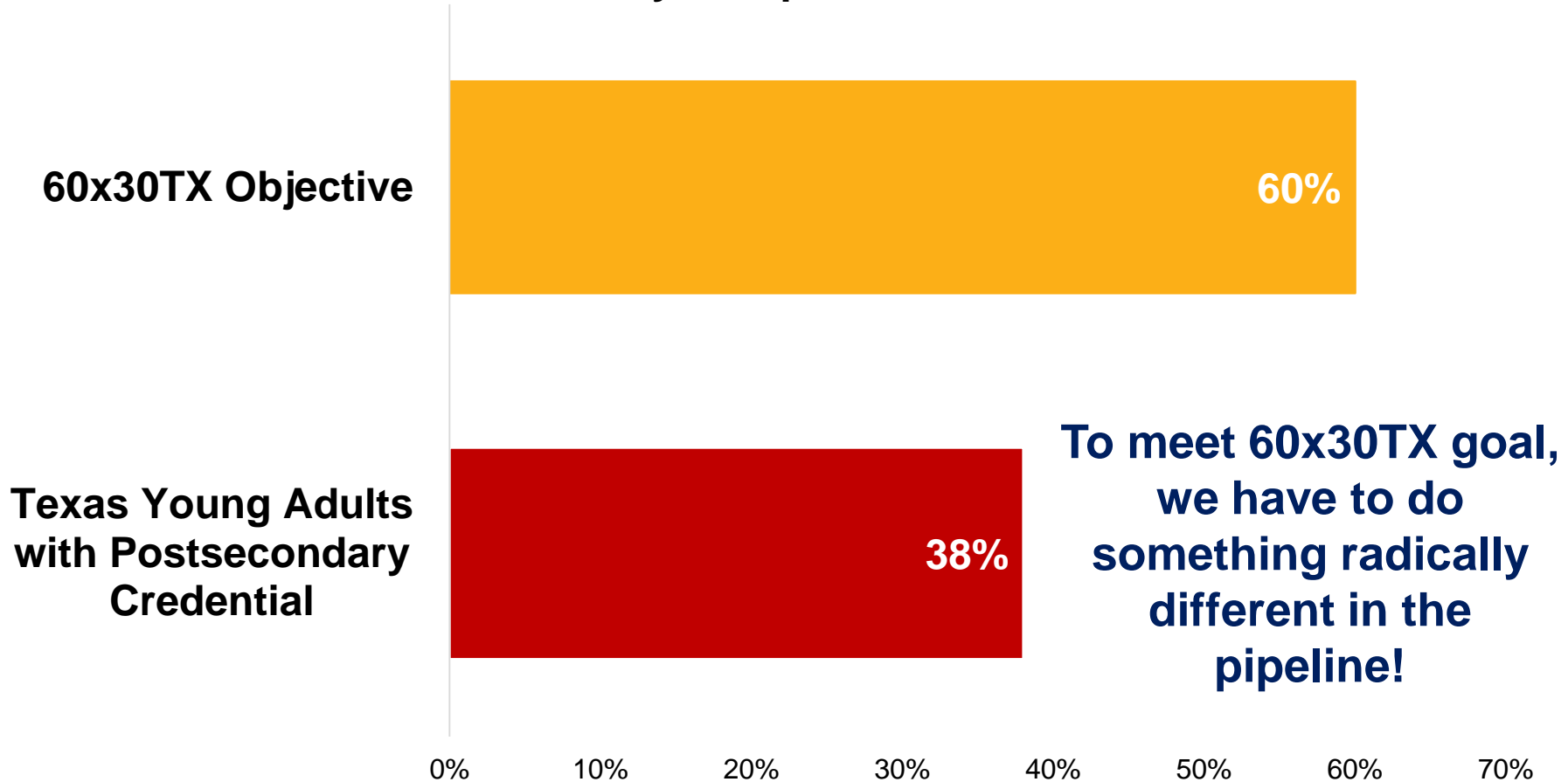
## Postsecondary Completion Rates

**60x30TX Objective**



# In 2017, We Are Far From That Goal

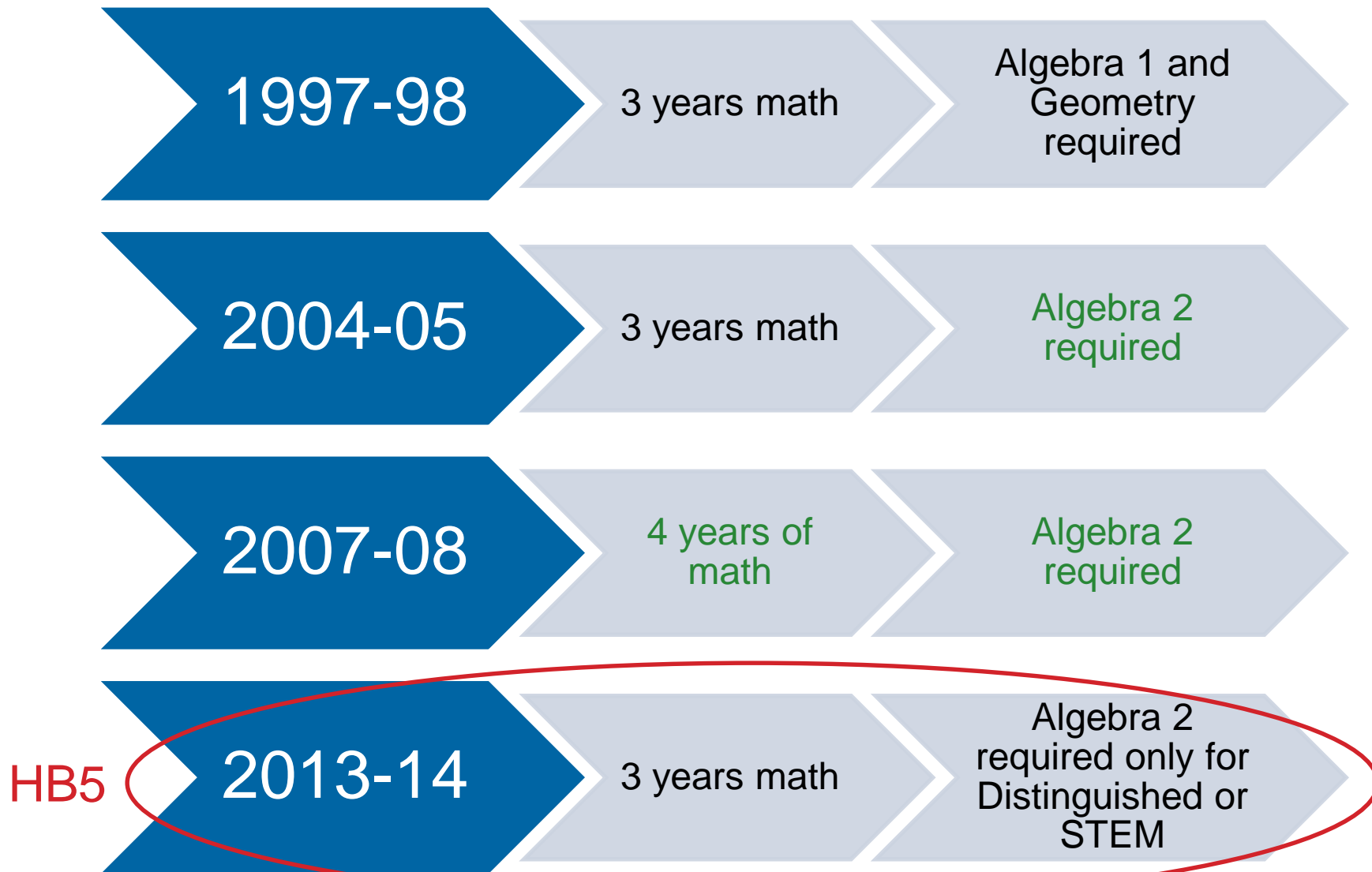
## Postsecondary Completion Rates



Objective: 60% of Young Adults, Ages 24-25, Have Postsecondary Credential

Source: THECB report <http://www.thecb.state.tx.us/reports/PDF/6584.PDF>

# Texas HS Graduation Policy Takes 2 Steps Back...



# Statewide Mathematics Analysis



**Amy Wiseman, Ph.D.**  
Director of Research Studies  
E3 Alliance

Equity Gap in Advanced Math Course Taking

Highest Math in High School



## Definition of Highest Math in High School

Algebra I

Geometry

Algebra II

PreCalculus

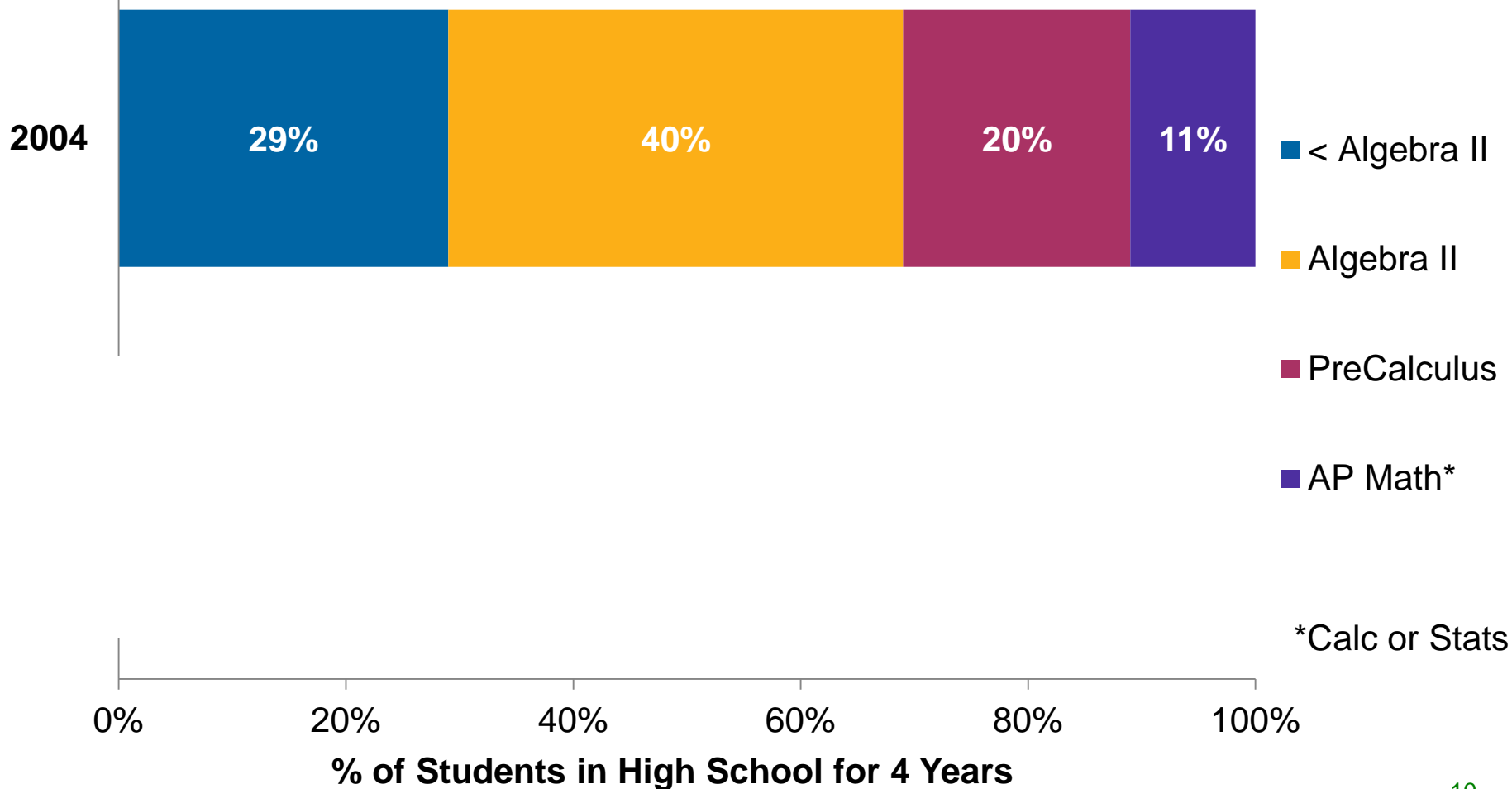
AP / IB / Dual Credit

**5 Years  
of Math!**

For students  
ready for  
Algebra in MS

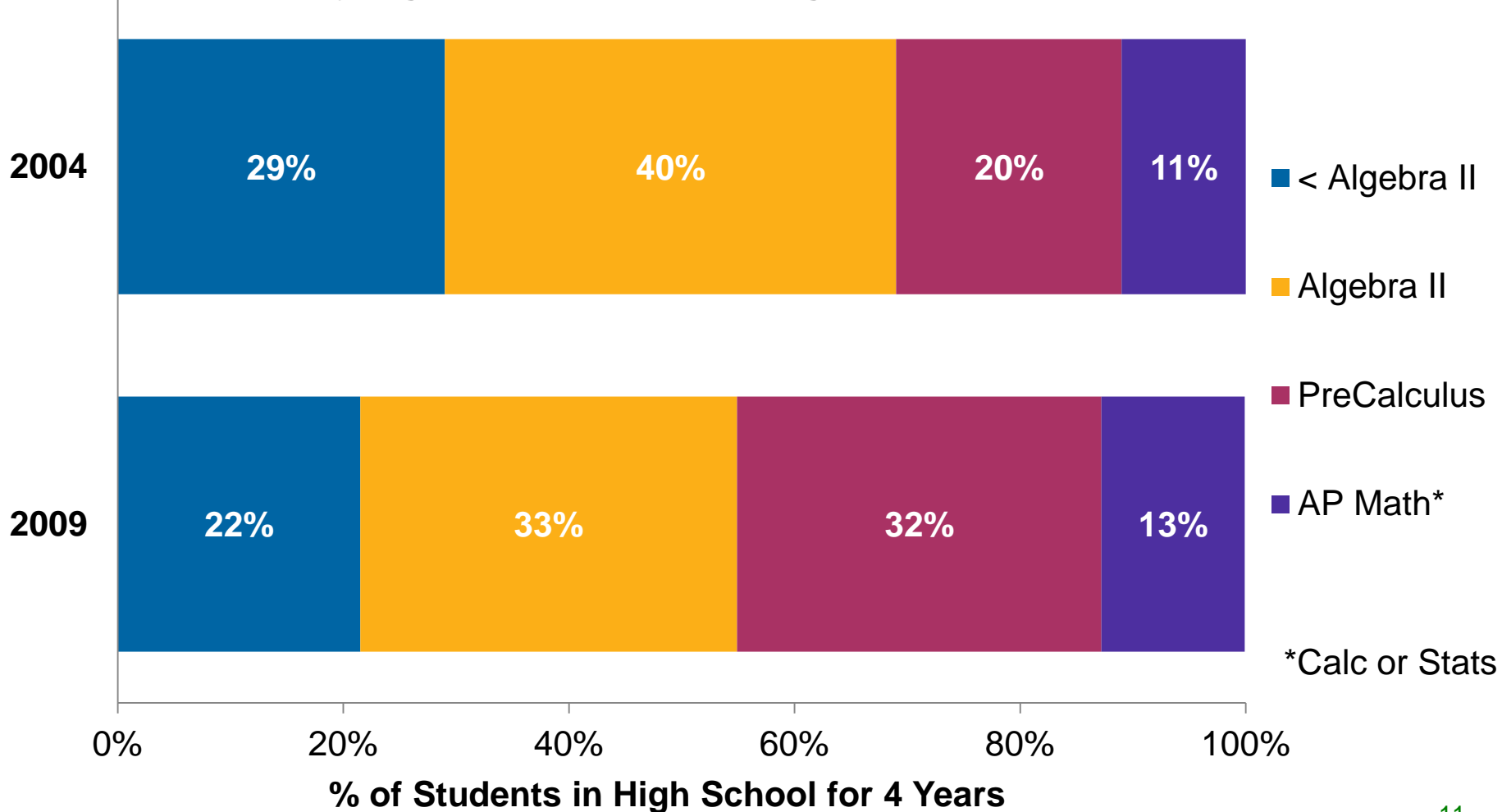
# Higher Proportion of 2009 Cohort had PreCalculus as Highest Math Passed

% of Students by Highest Math Passed in High School, Texas 9<sup>th</sup> Grade Cohorts



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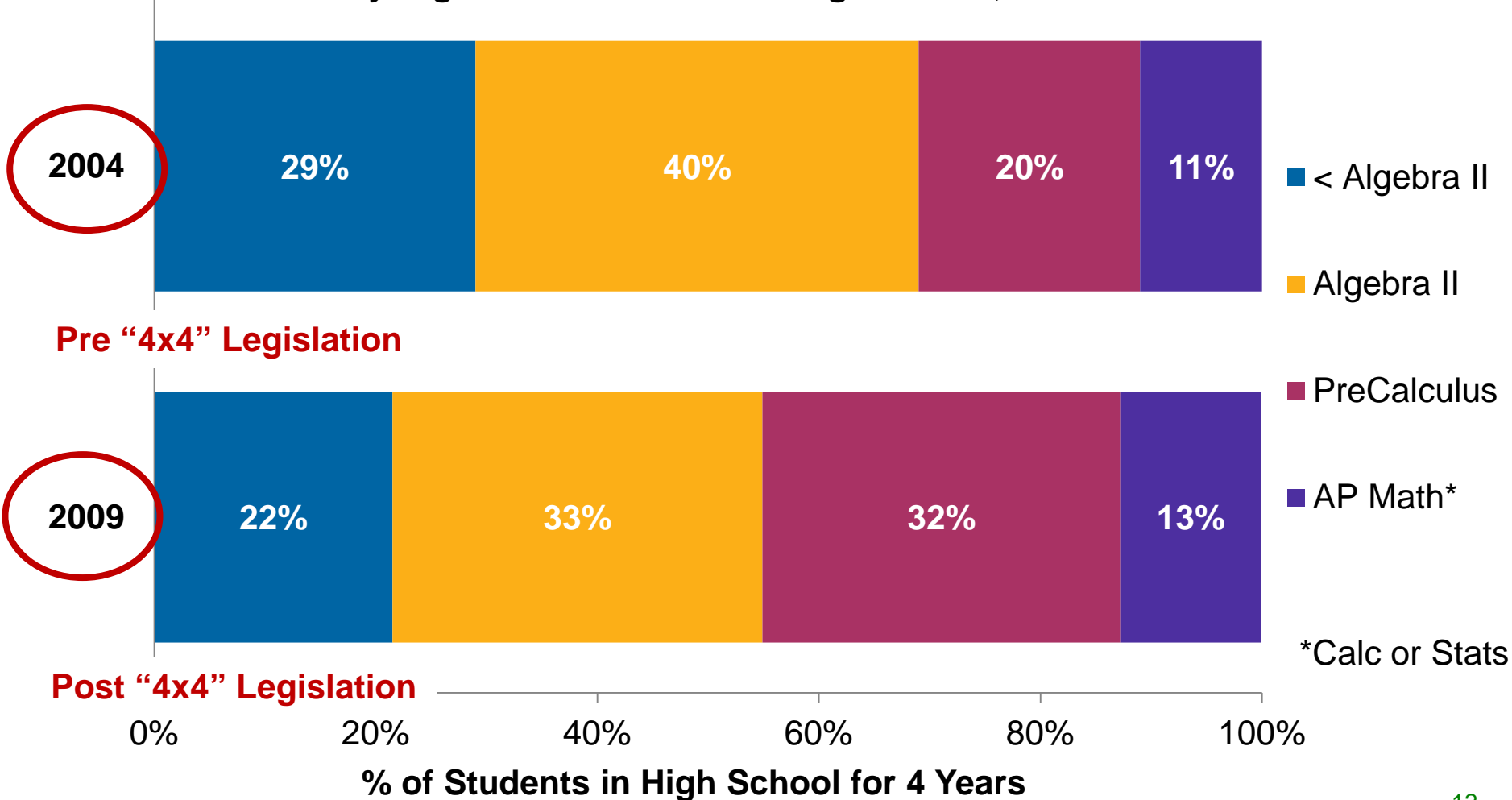
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% of Students in High School for 4 Years

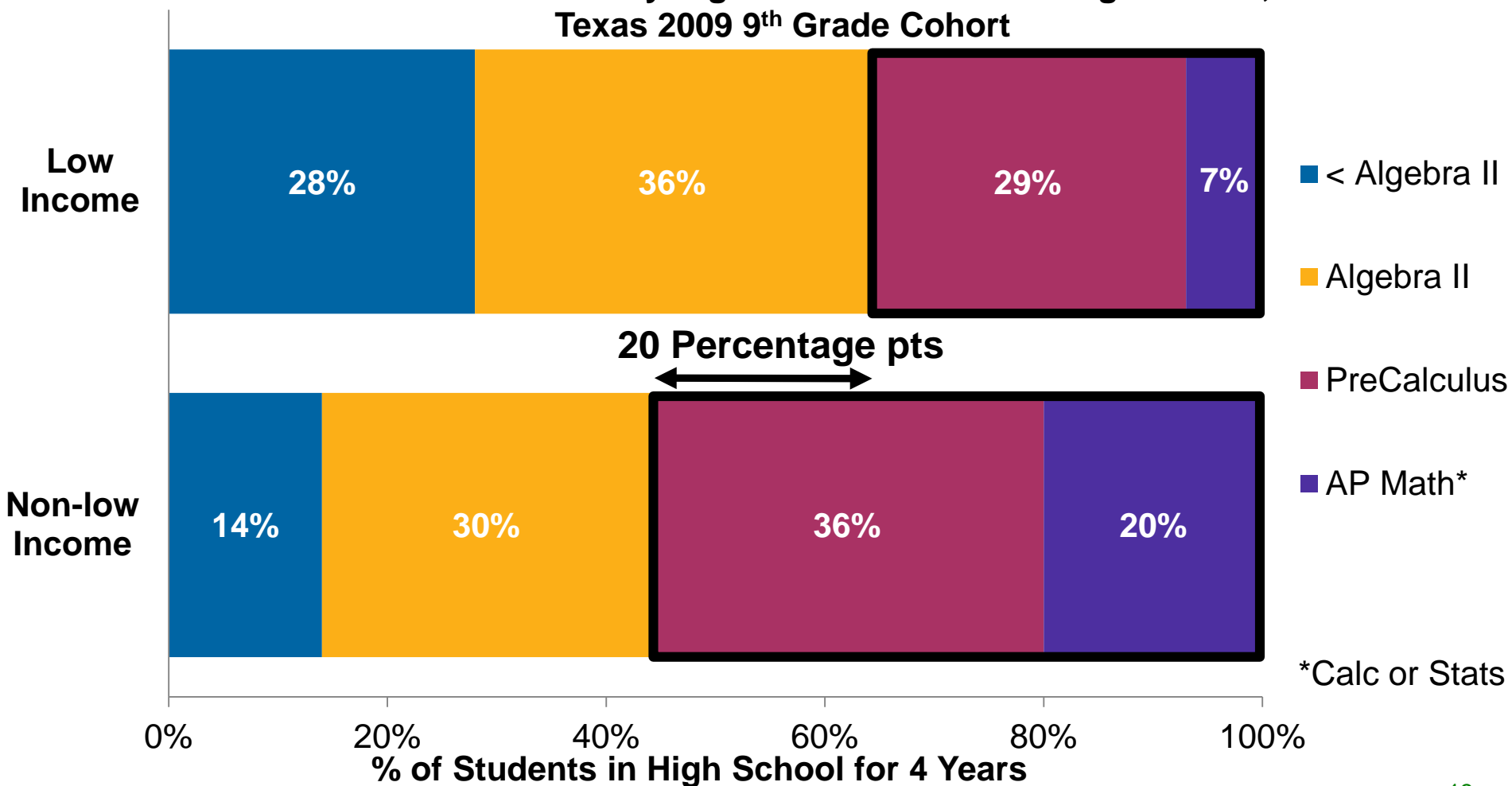
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# Much Larger Share of Non-Low Income Students Mastered PreCalculus or Above

**Percent of Students by Highest Math Passed in High School, Texas 2009 9<sup>th</sup> Grade Cohort**

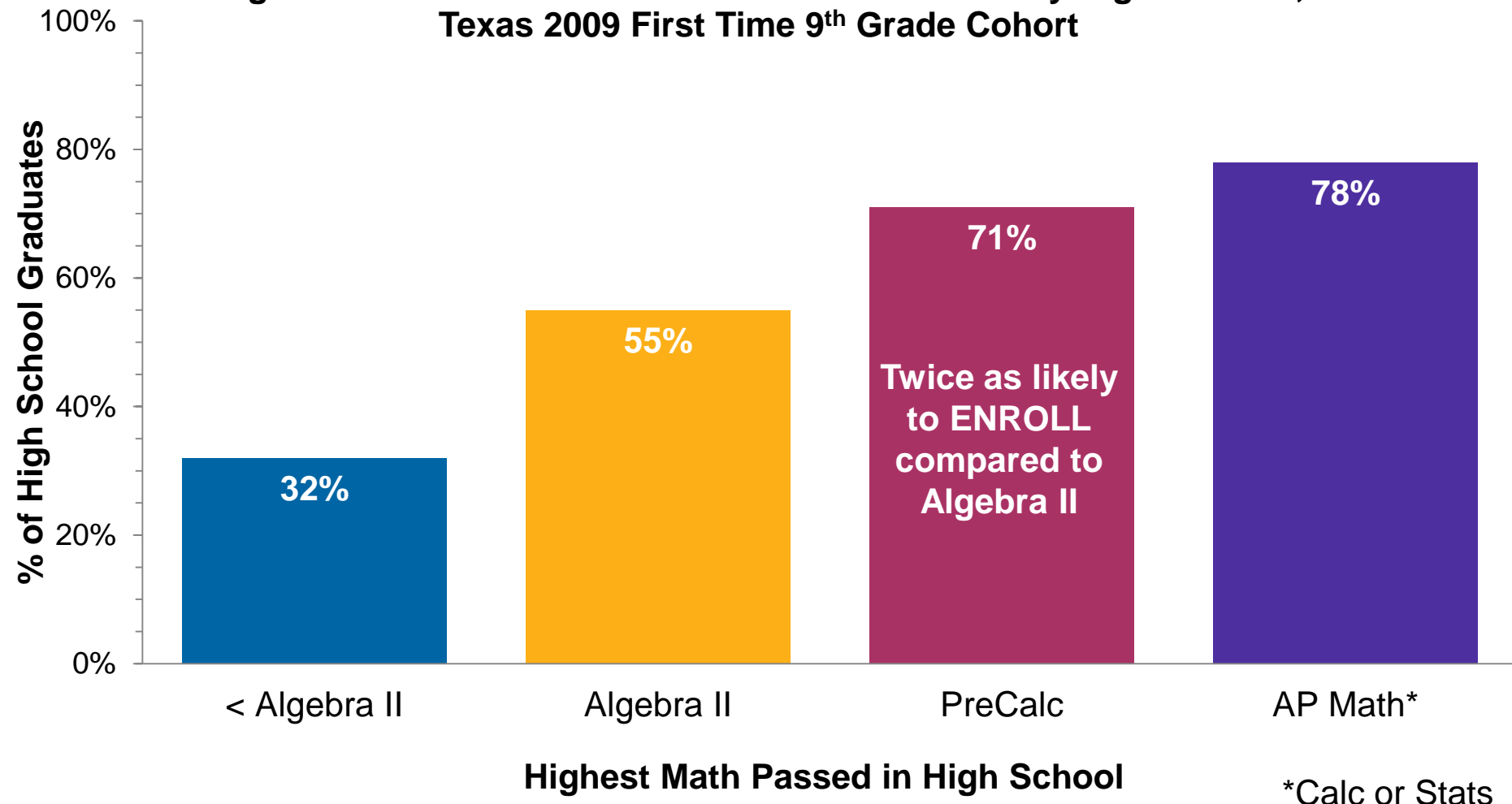


More Advanced Math in High School Helps Mitigate Equity Gap

## Postsecondary Success by Highest Math in High School

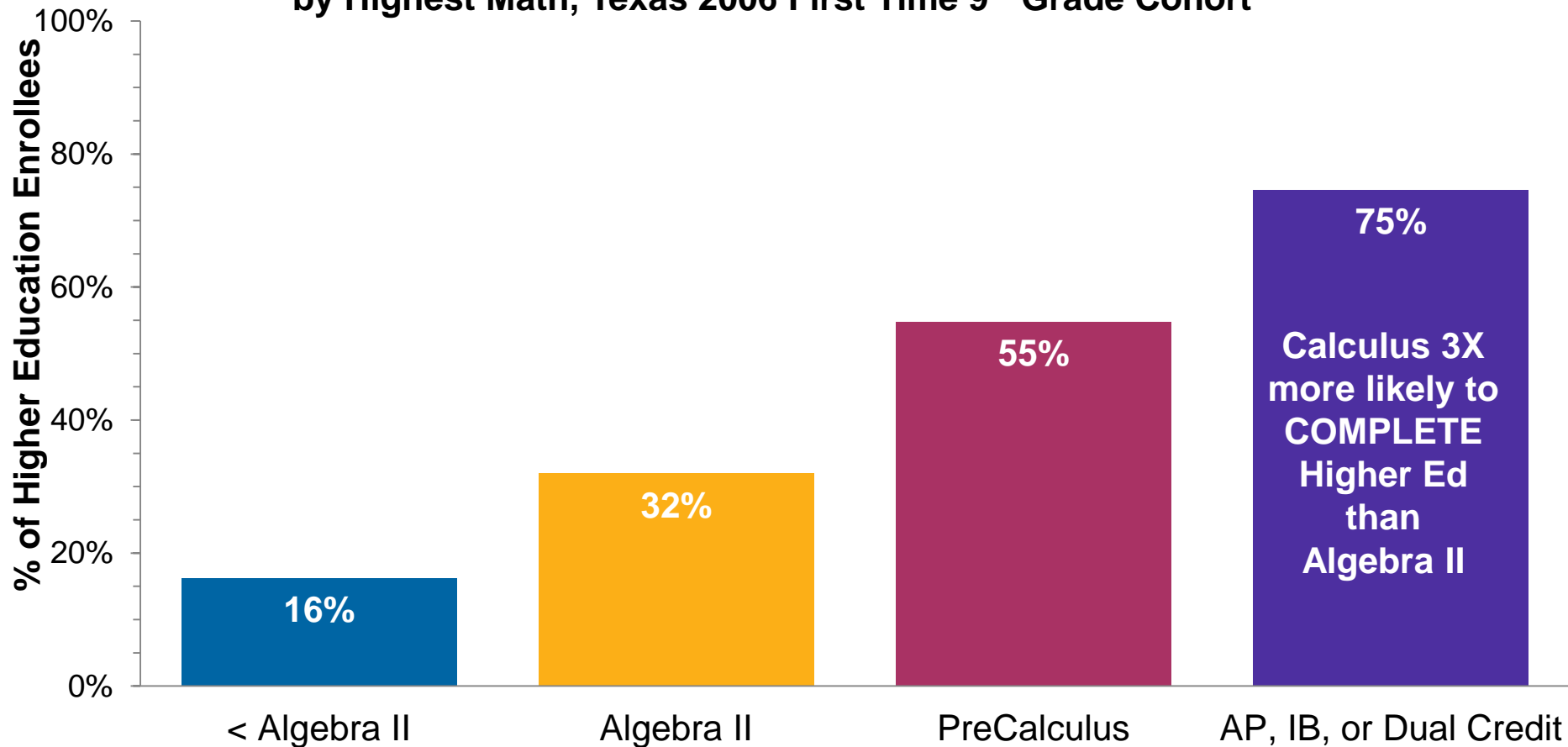
# Students Who Complete PreCalculus or Higher Are More Likely to Enroll in College

**Higher Education Enrollment Rates of Graduates by Highest Math,  
Texas 2009 First Time 9<sup>th</sup> Grade Cohort**



# 3 in 4 Higher Ed Enrollees with AP for Highest Math Completed

**Texas Higher Education Enrollees' 6 Year Completion Rates by Highest Math, Texas 2006 First Time 9<sup>th</sup> Grade Cohort**

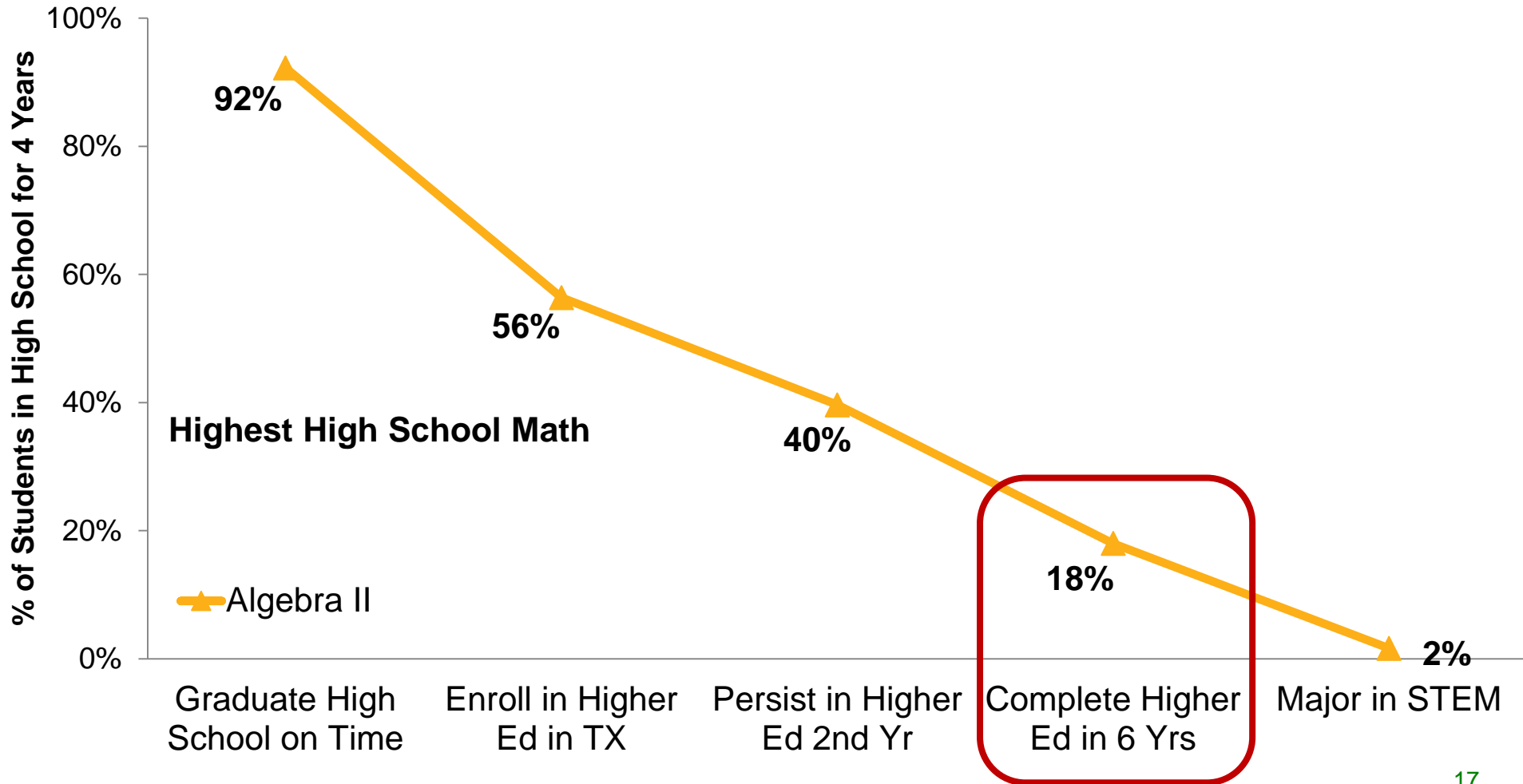


## Highest Math Passed in High School



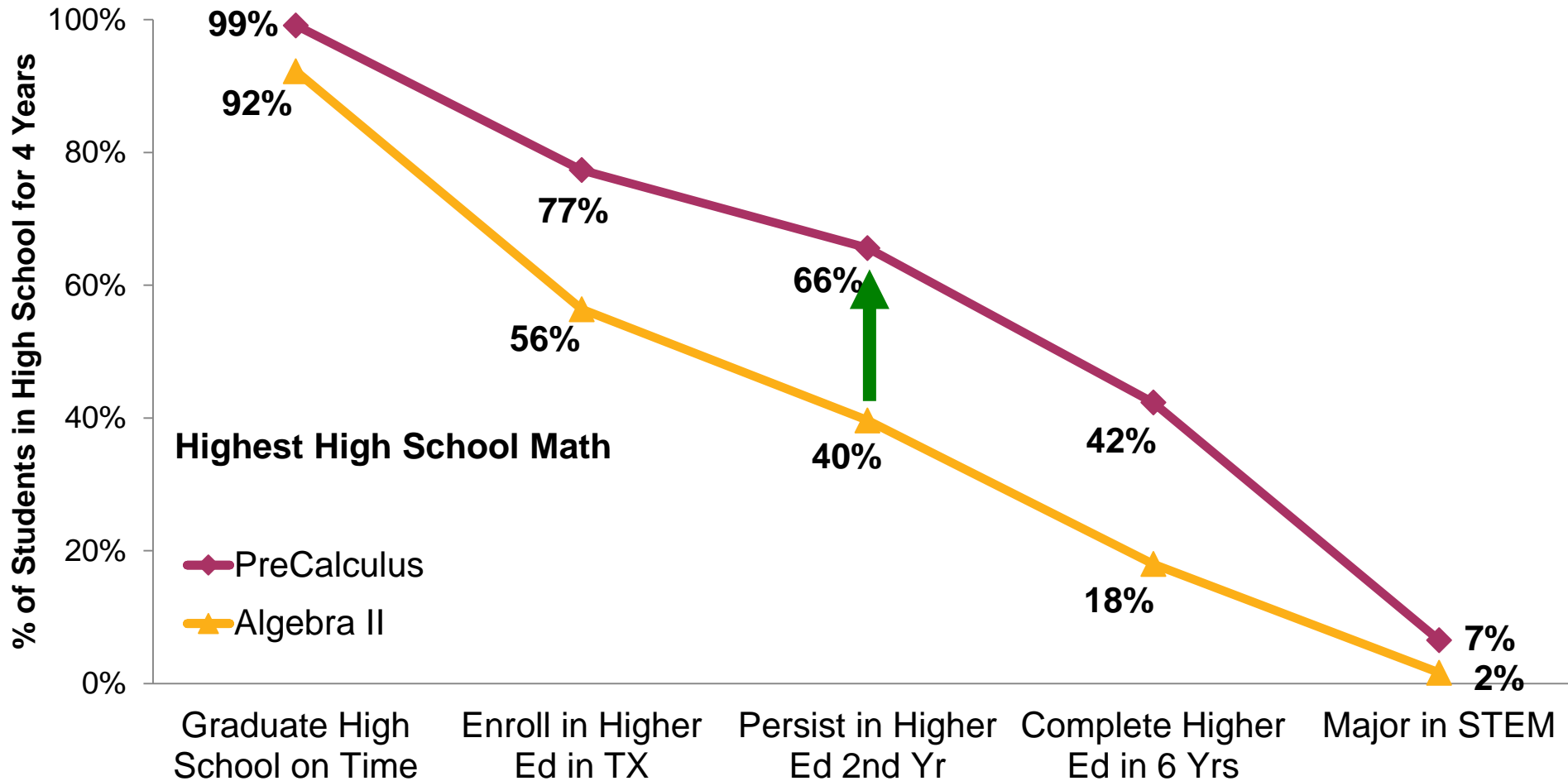
# Gaps in Higher Education Outcome Rates by Highest Math

Outcomes of Students in HS for 4 Years, Texas 2006 First Time 9<sup>th</sup> Grade Cohort



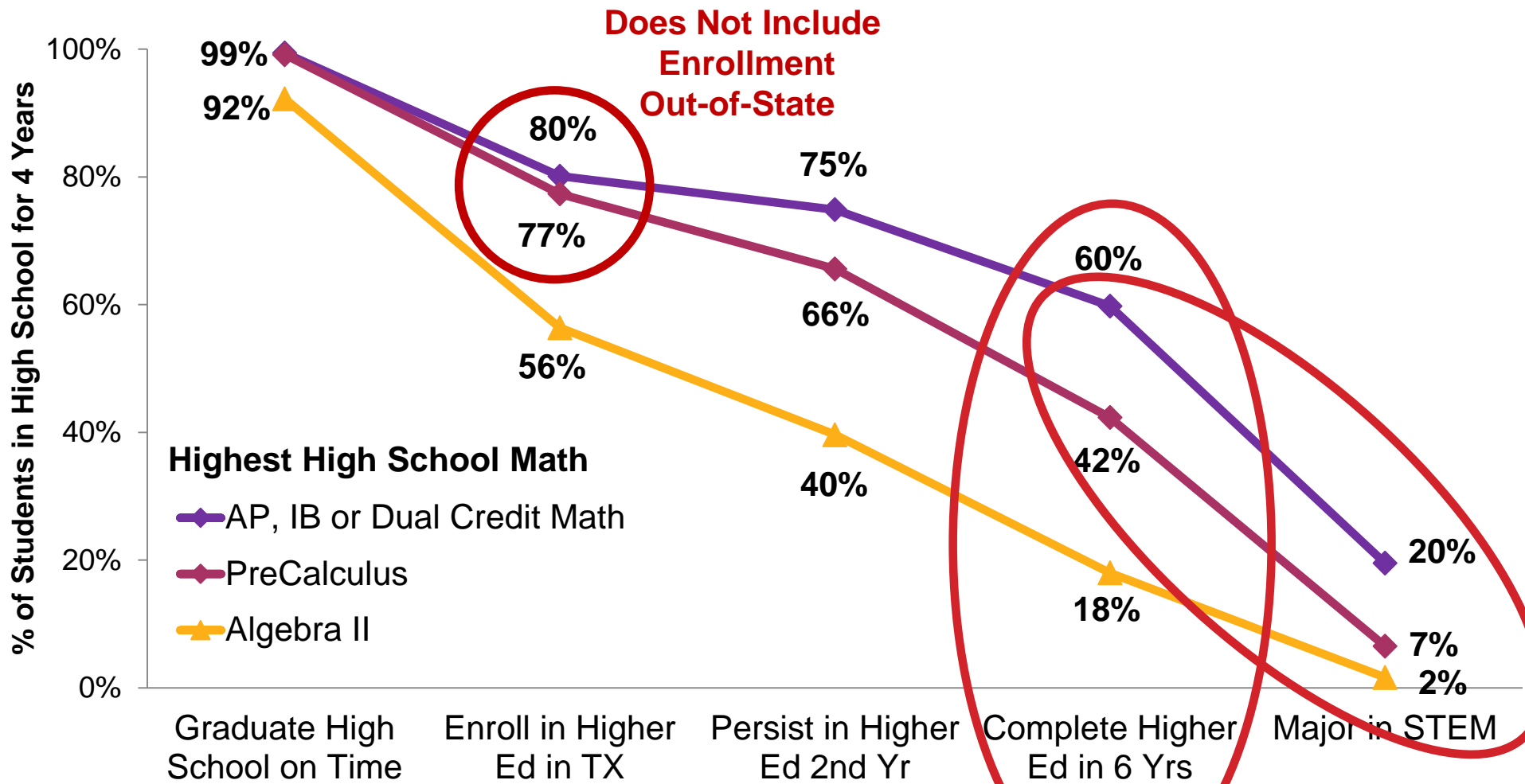
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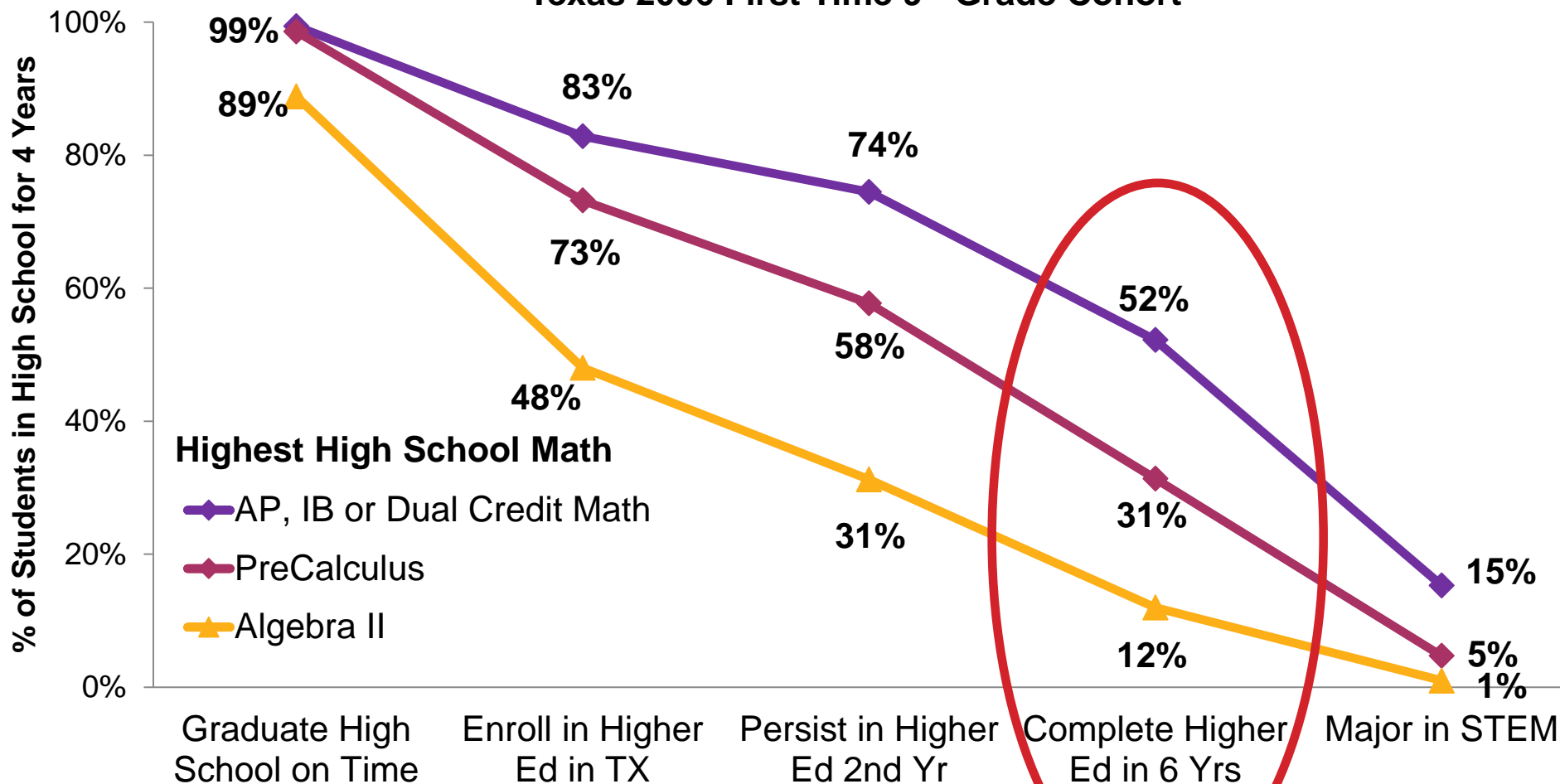
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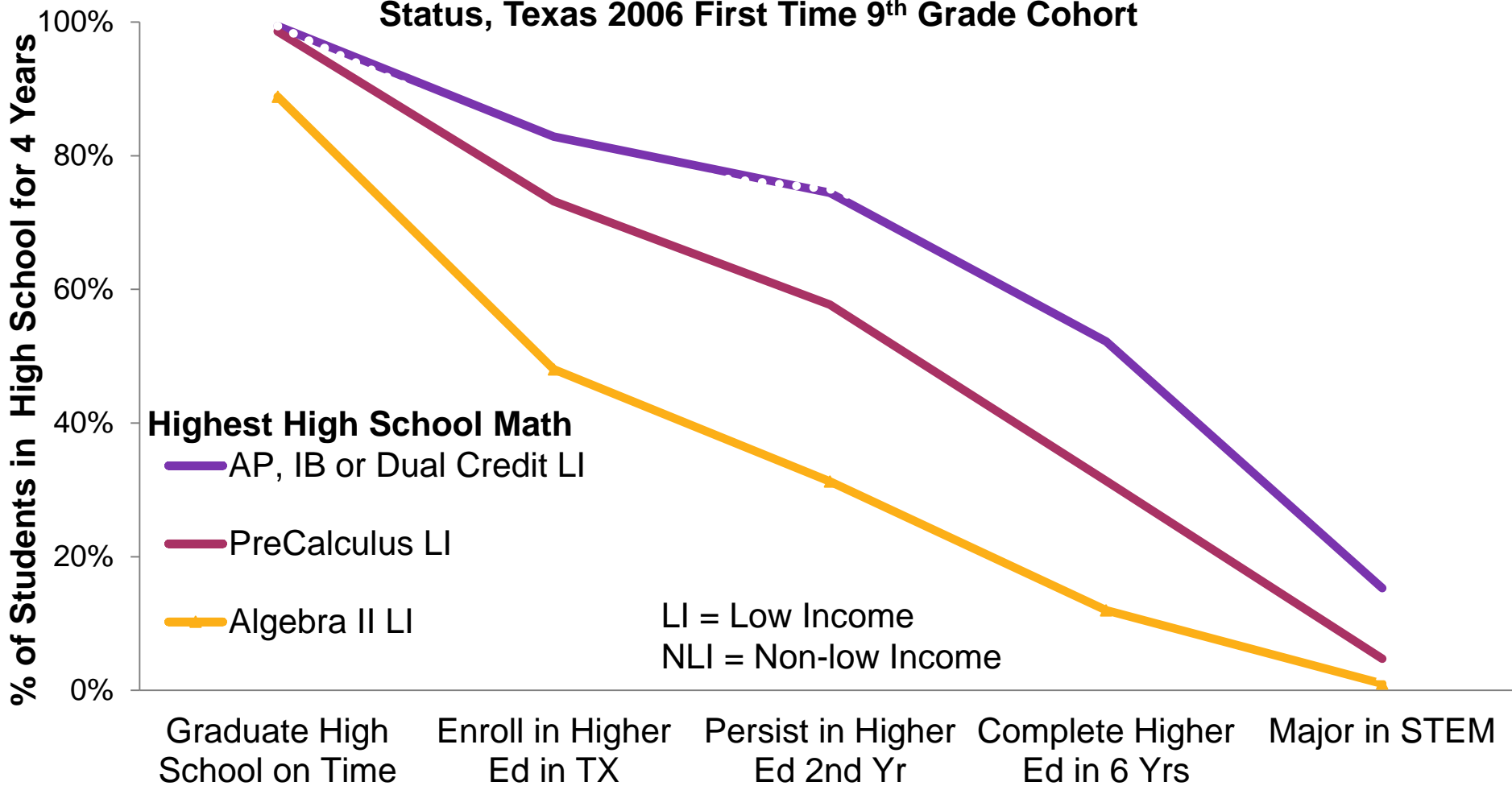
# Large Gaps for Low Income Students in Higher Ed Outcomes Rates by Highest Math

**Outcomes of Low Income Students in HS for 4 Years  
Texas 2006 First Time 9<sup>th</sup> Grade Cohort**



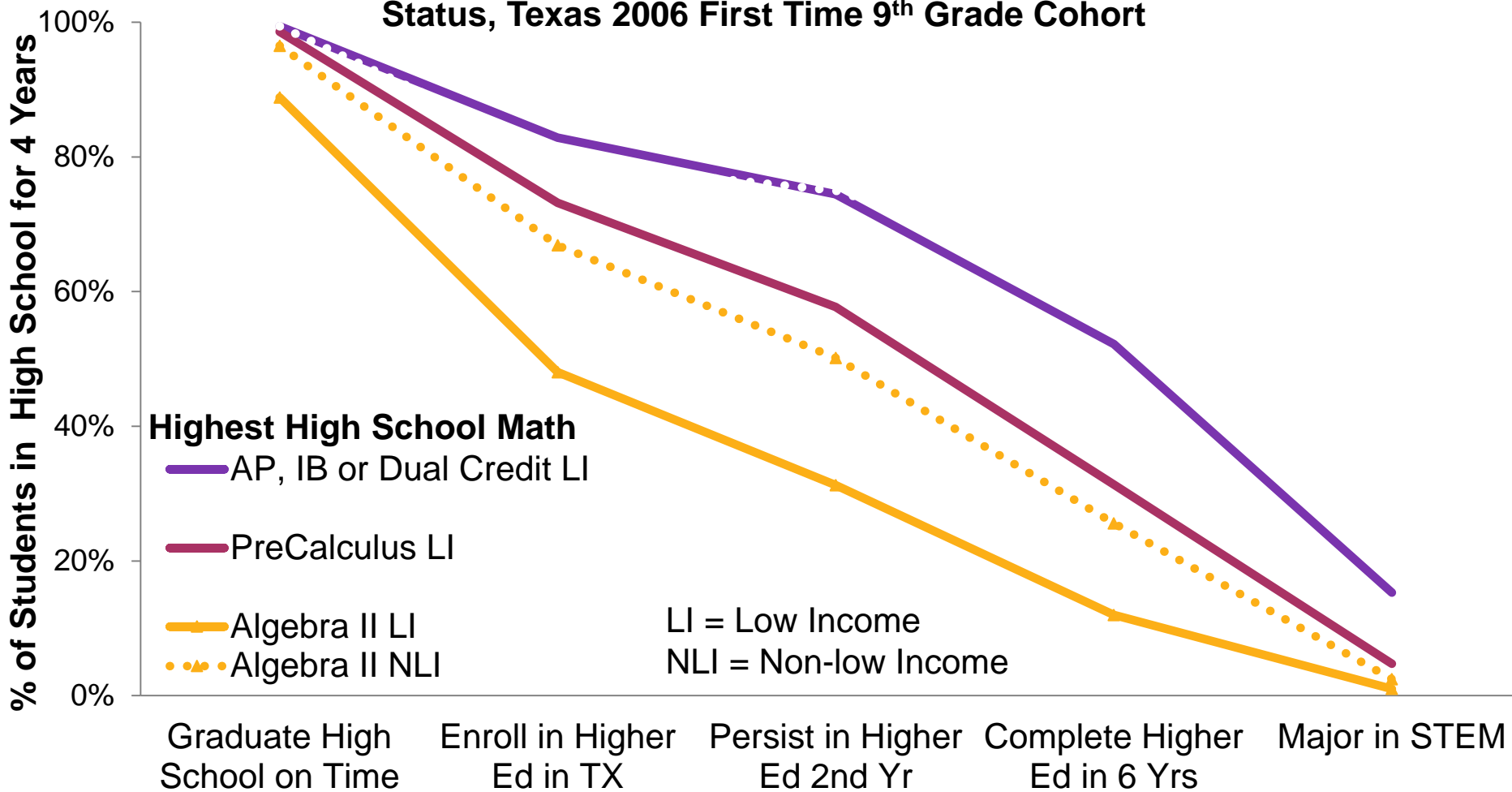
# Low Income Student Outcomes Look Like Outcomes of Non-Low Income Students with One Fewer HS Math

**Outcomes of Students in HS for 4 Years by Highest Math and Income Status, Texas 2006 First Time 9<sup>th</sup> Grade Cohort**



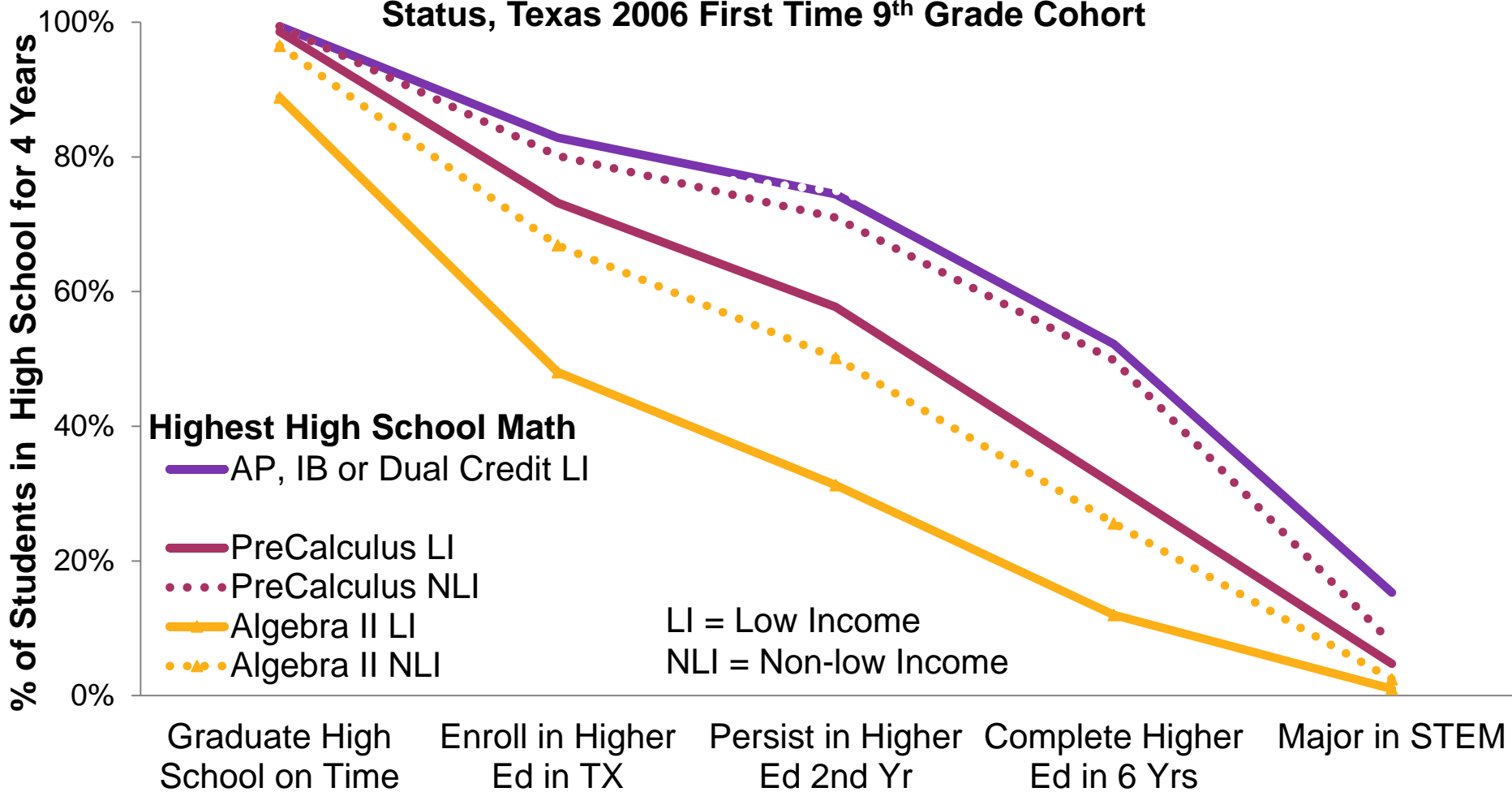
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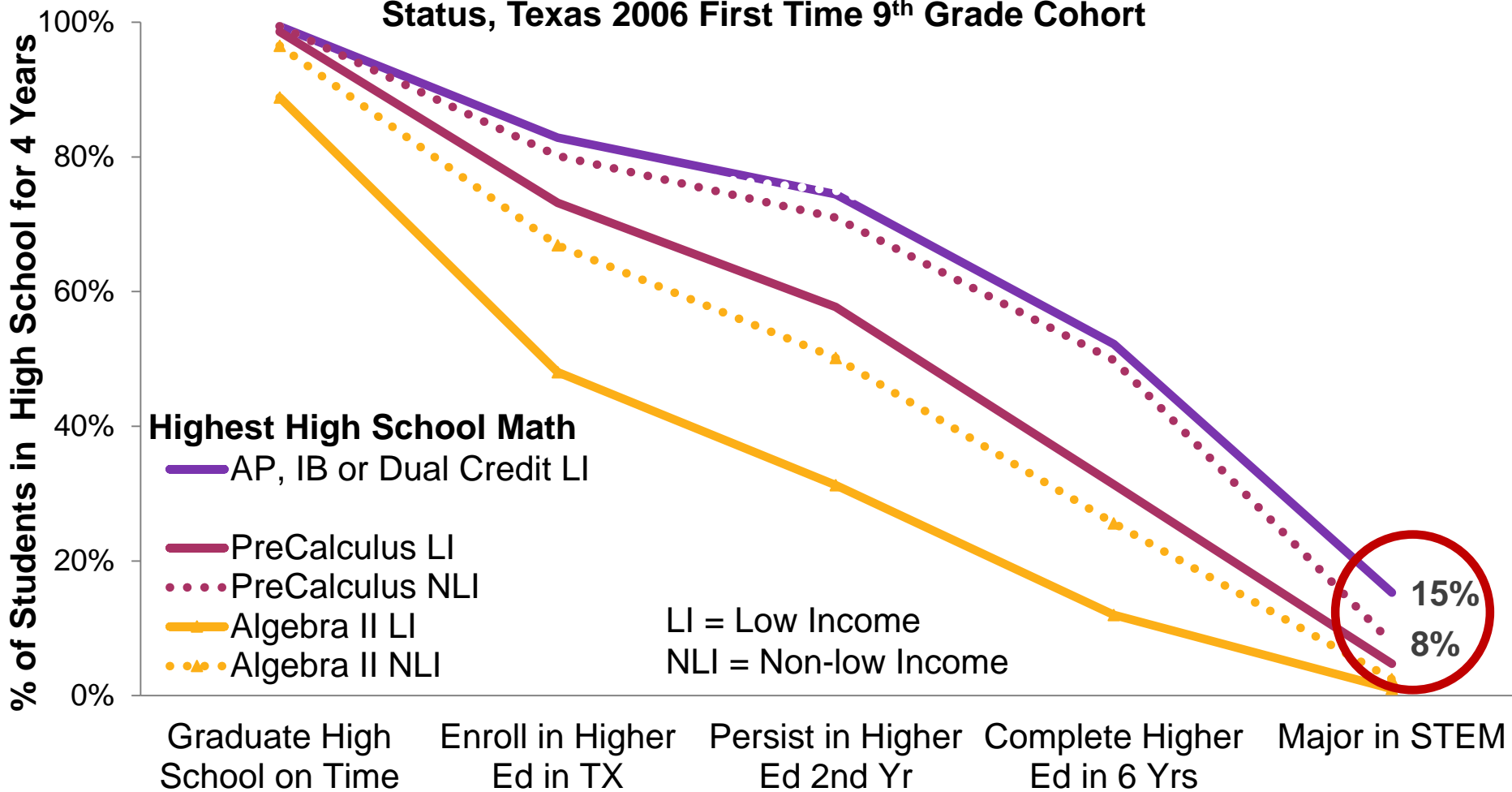
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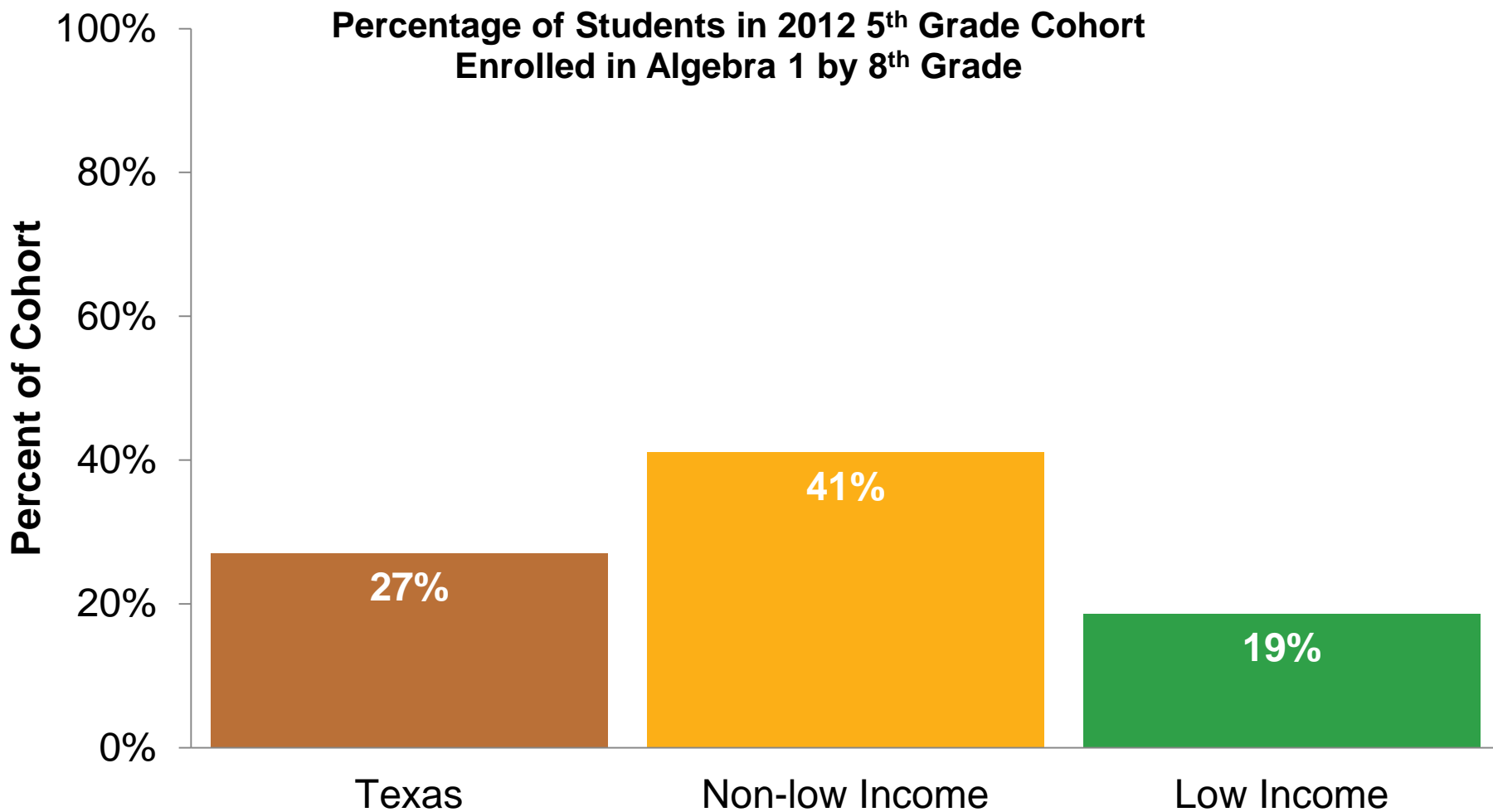




How to Shrink Equity Gap in High School Math Course Taking:

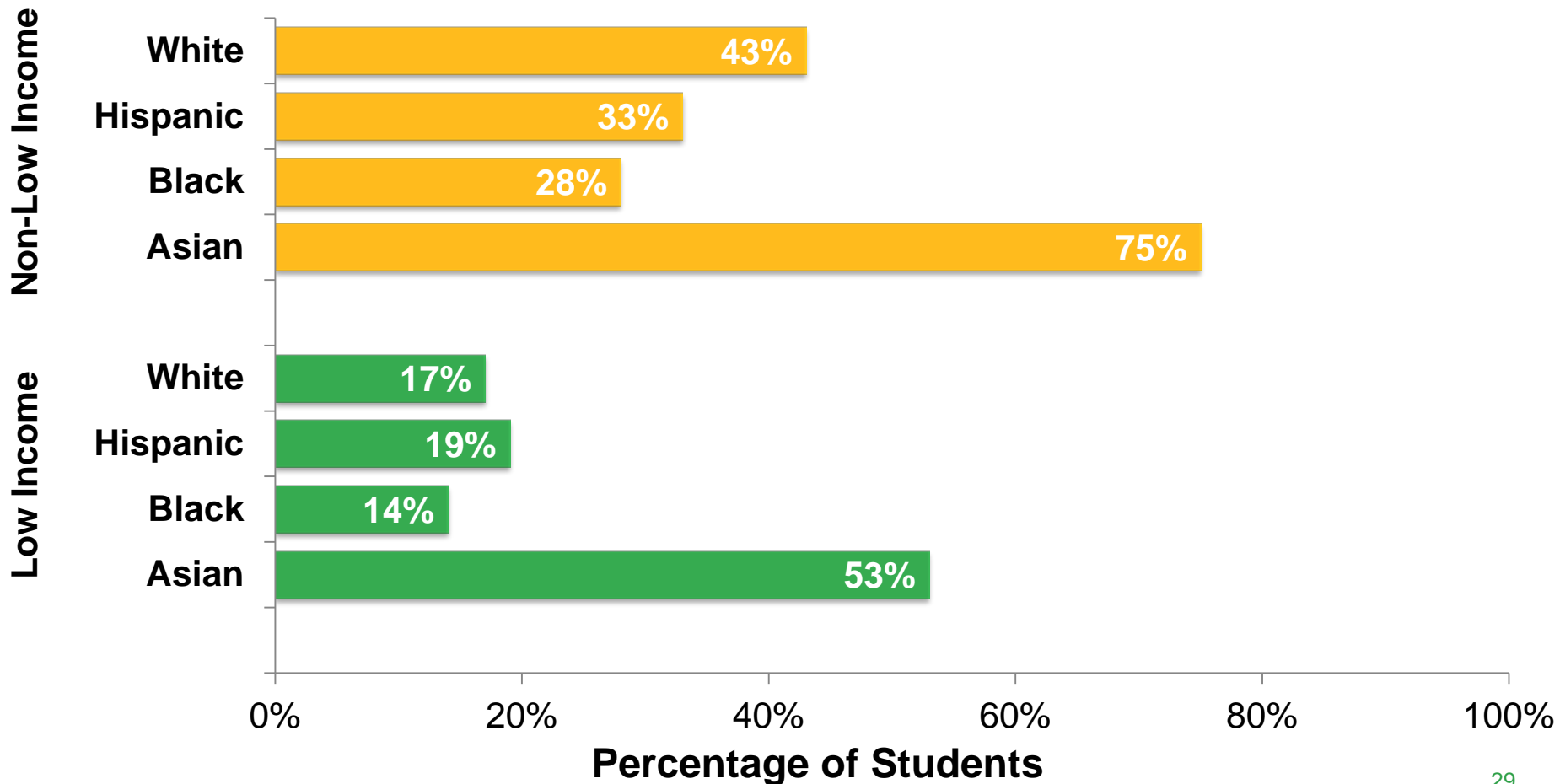
## Algebra I Enrollment in Middle School for Prepared Students

# Over 20 Percentage Point Gap by Income Status for Middle School Algebra 1 Enrollment Rates



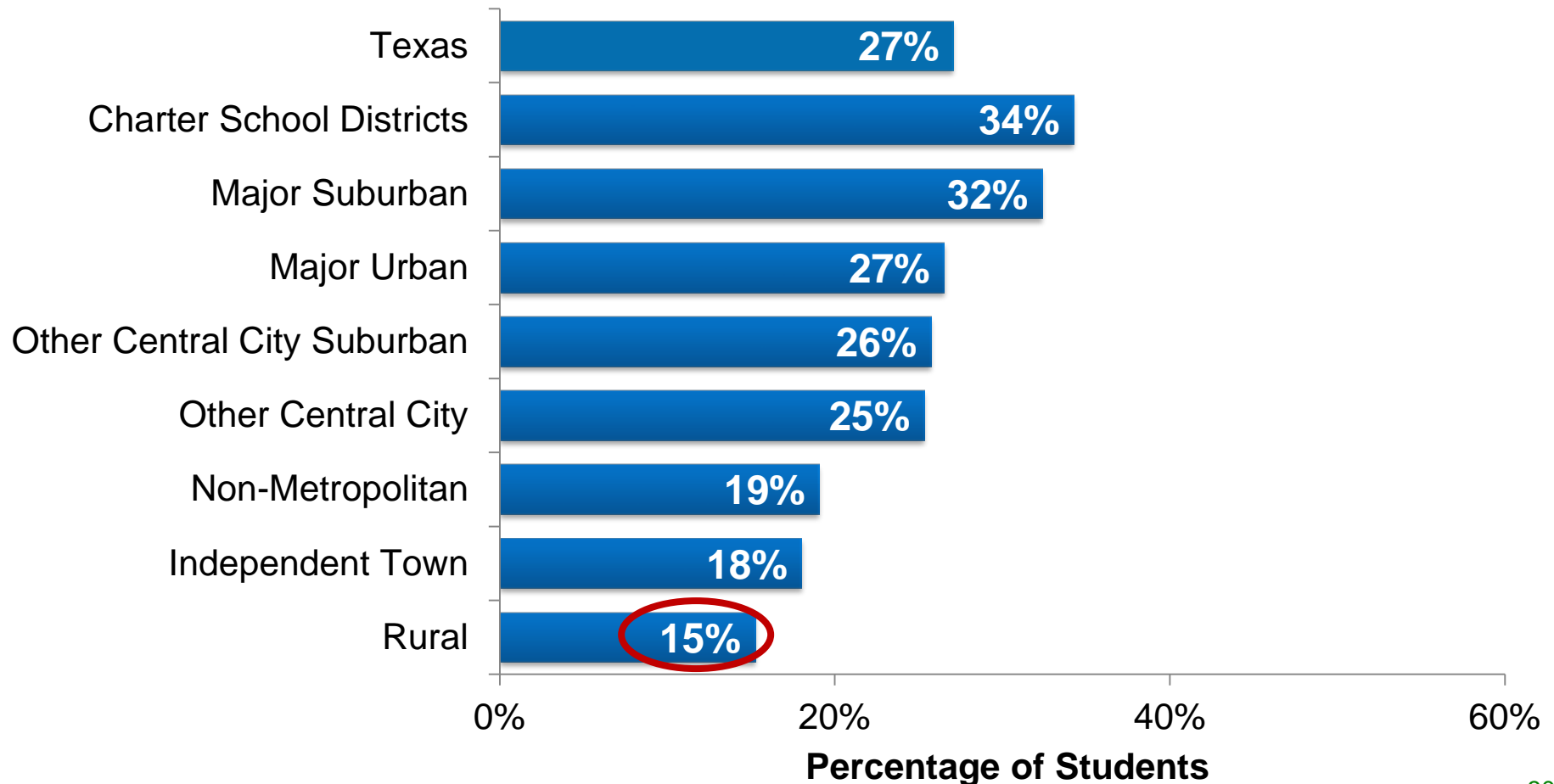
# Enrollment Gap Exists Even for Non-Low Income Black & Hispanic Students

Percentage of Students in 2012 Texas 5<sup>th</sup> Grade Cohort Enrolled in Algebra 1 by 8<sup>th</sup> Grade



# Students in Rural Districts Have the LEAST Opportunity to Enroll in Algebra I by 8<sup>th</sup> Grade

**Percentage of Students in 2012 5<sup>th</sup> Grade Cohort Enrolled in Algebra 1 by 8<sup>th</sup> Grade**



## What about Passing?

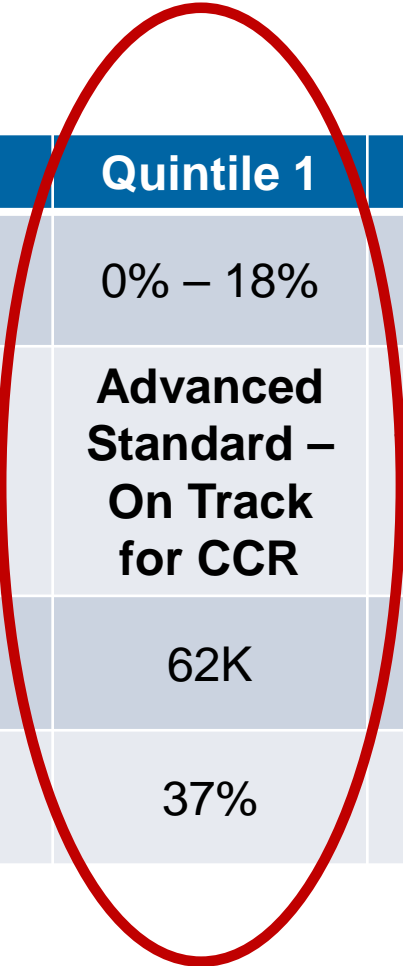
When Algebra I is taken in Middle School in Texas

- 96% pass both semesters of the course
- 98% pass the Algebra 1 EOC (Phase 1 Standard)
  - And 58% achieve Advanced Standard!

Sometimes equity gaps exist because of concerns that not all student can be successful

**But data shows this isn't the case**

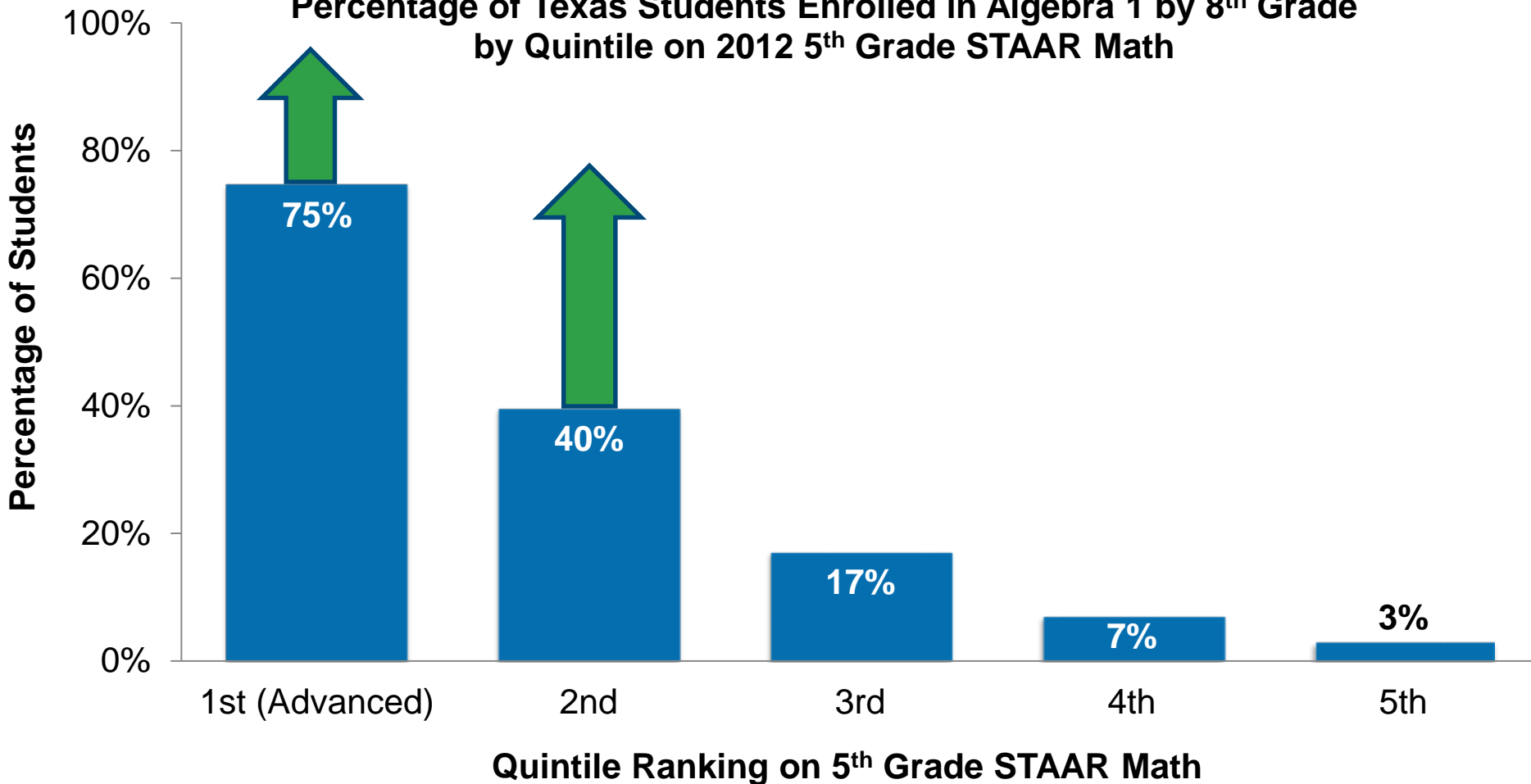
# Using Quintiles to Study Outcomes of Students Most Prepared in 5<sup>th</sup> Grade Math



	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Percent range	0% – 18%	18% - 39%	39%-58%	58%-77%	77%-100%
<b>STAAR Math Score Meaning</b>	<b>Advanced Standard – On Track for CCR</b>	<b>Passed with Higher Score – Bubble</b>	<b>Passed</b>	<b>Most Passed</b>	<b>Failed or STAAR M</b>
# Texas Students	62K	70K	66K	66K	78K
% Low Income	37%	54%	64%	72%	80%

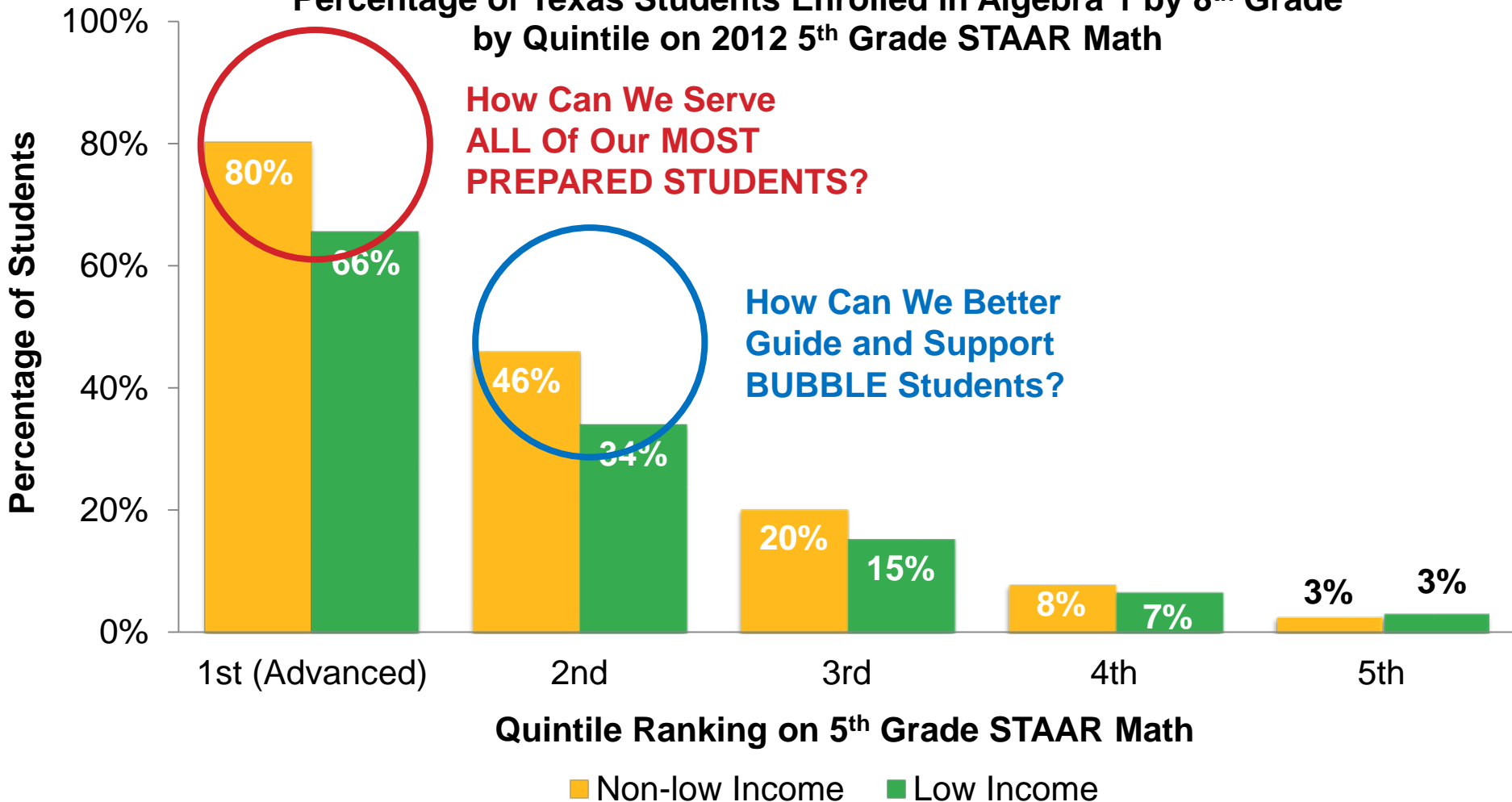
# Three-Fourths of Students at Advanced Standard in 5<sup>th</sup> Grade Reach Algebra I by 8<sup>th</sup> Grade

**Percentage of Texas Students Enrolled in Algebra 1 by 8<sup>th</sup> Grade by Quintile on 2012 5<sup>th</sup> Grade STAAR Math**



# 2/3 of Low Income Students at Advanced Standard for 5<sup>th</sup> Grade Math Were in Algebra I by 8<sup>th</sup> Grade

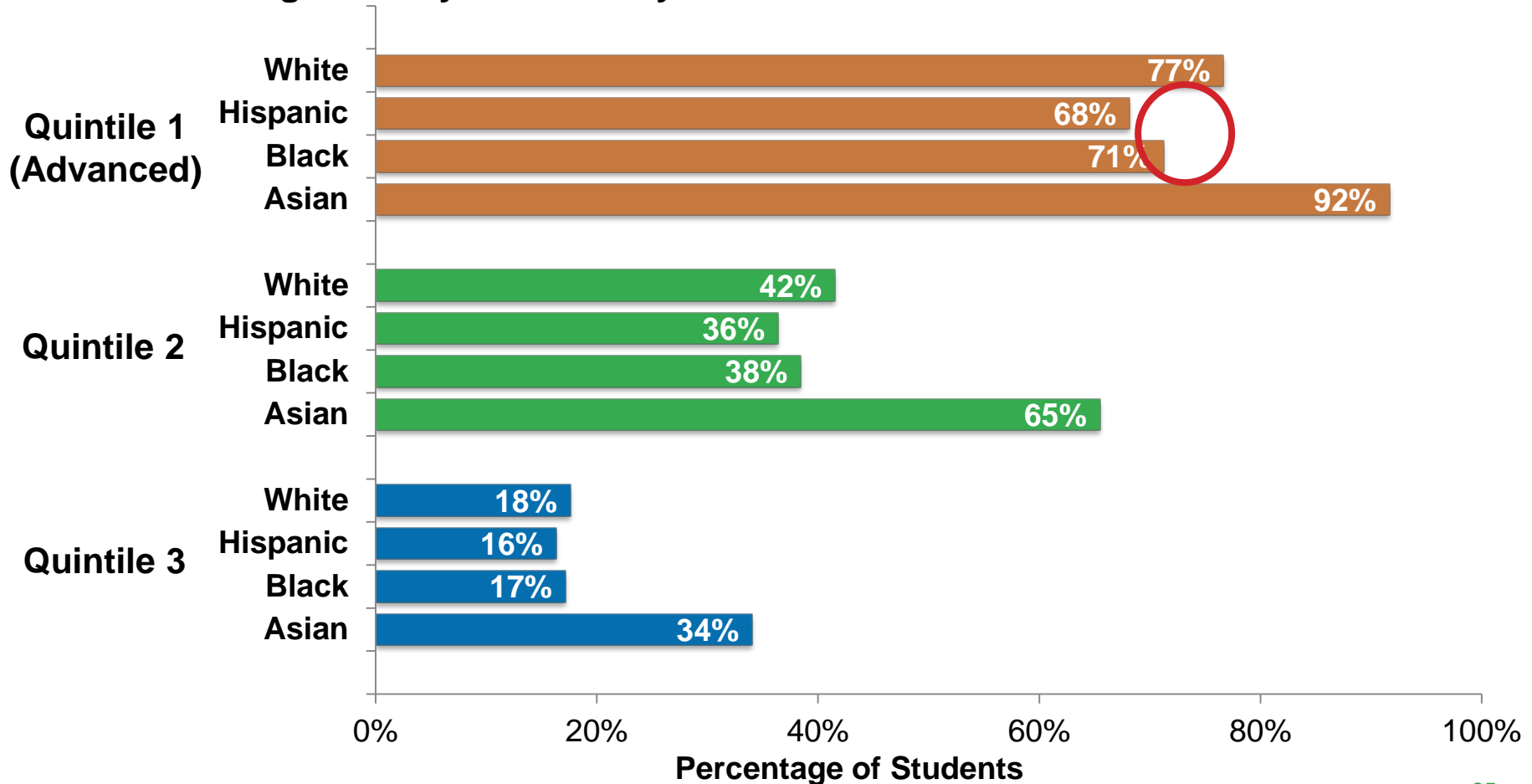
**Percentage of Texas Students Enrolled in Algebra 1 by 8<sup>th</sup> Grade by Quintile on 2012 5<sup>th</sup> Grade STAAR Math**





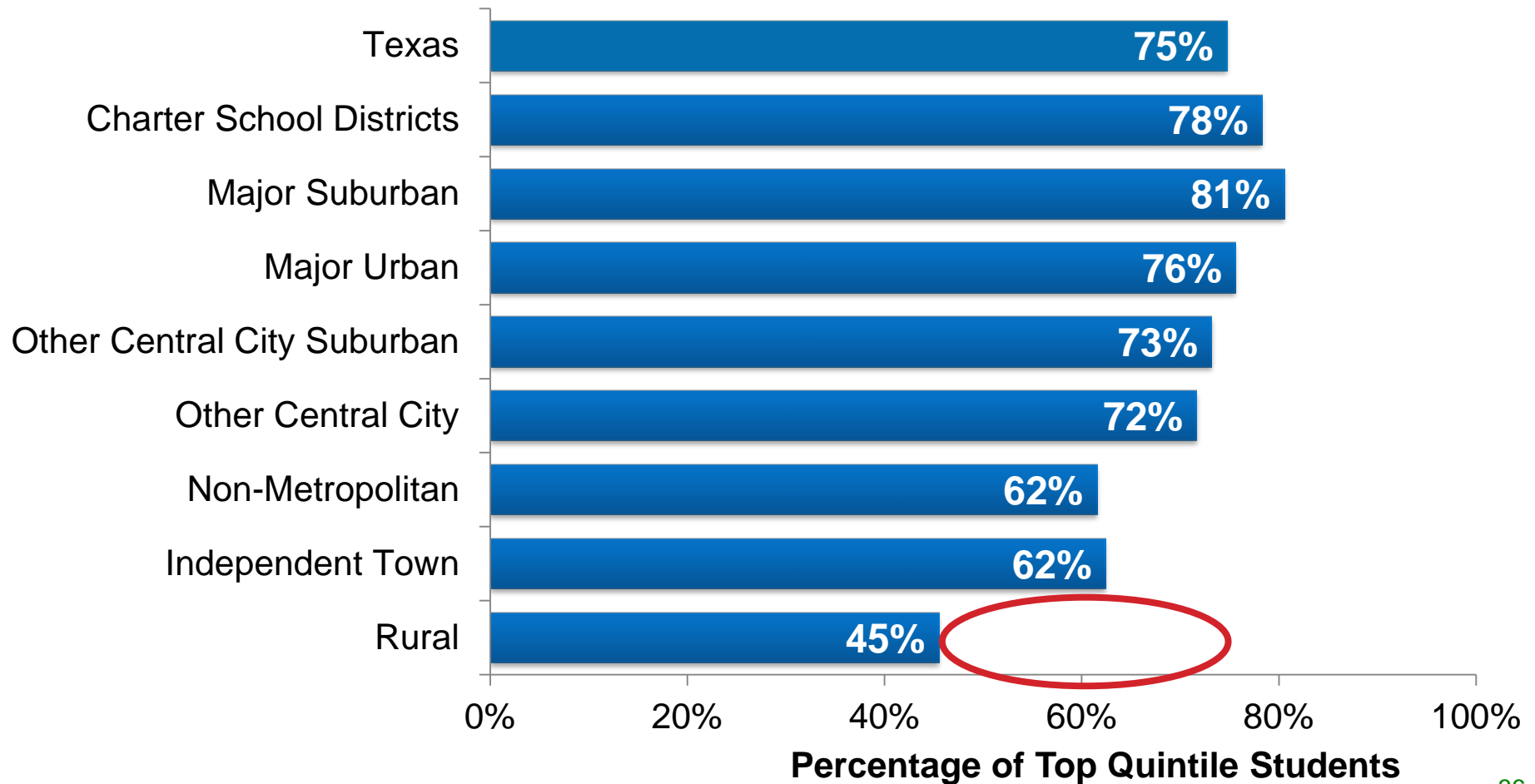
# Lower Proportion of Black and Hispanic Students at Advanced Std in 5<sup>th</sup> Grade Enrolled in Algebra 1 in MS

**Percentage of 2012 Texas 5<sup>th</sup> Grade Cohort Enrolled in Algebra 1 by 8<sup>th</sup> Grade by Quintile on 5<sup>th</sup> Grade STAAR Math**



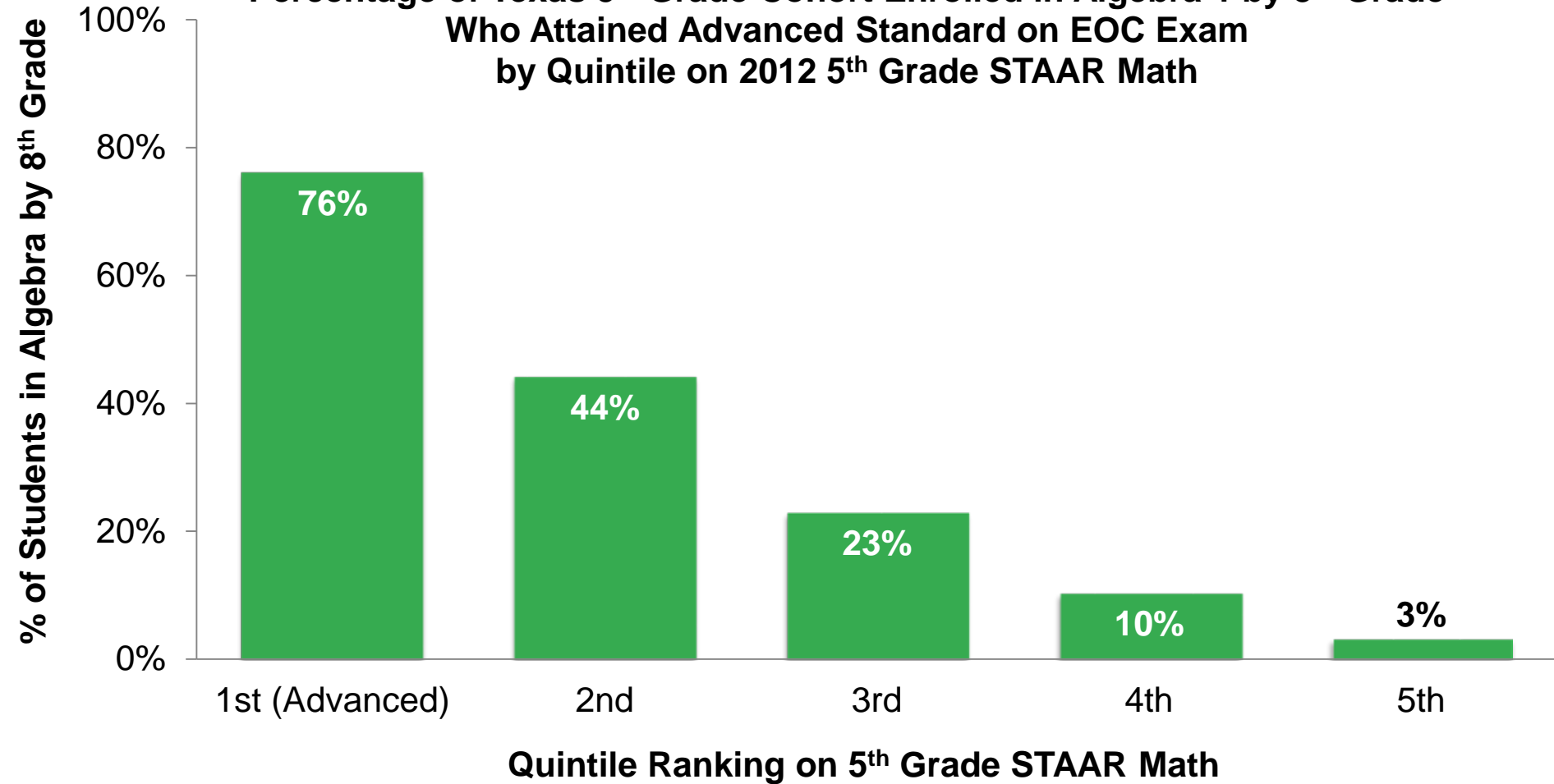
# For Students We Consider Absolutely Prepared, Rural Students Are Not Well Served => Lack Opportunity

**Of Students Who Ranked in Top Quintile on 5th Grade STAAR Math,  
Percent Who Enrolled in Algebra I by 8th Grade**



# Three-Fourths of 5<sup>th</sup> Graders in Top Quintile Who Took Algebra I by 8<sup>th</sup> Grade Achieved Advanced Standard

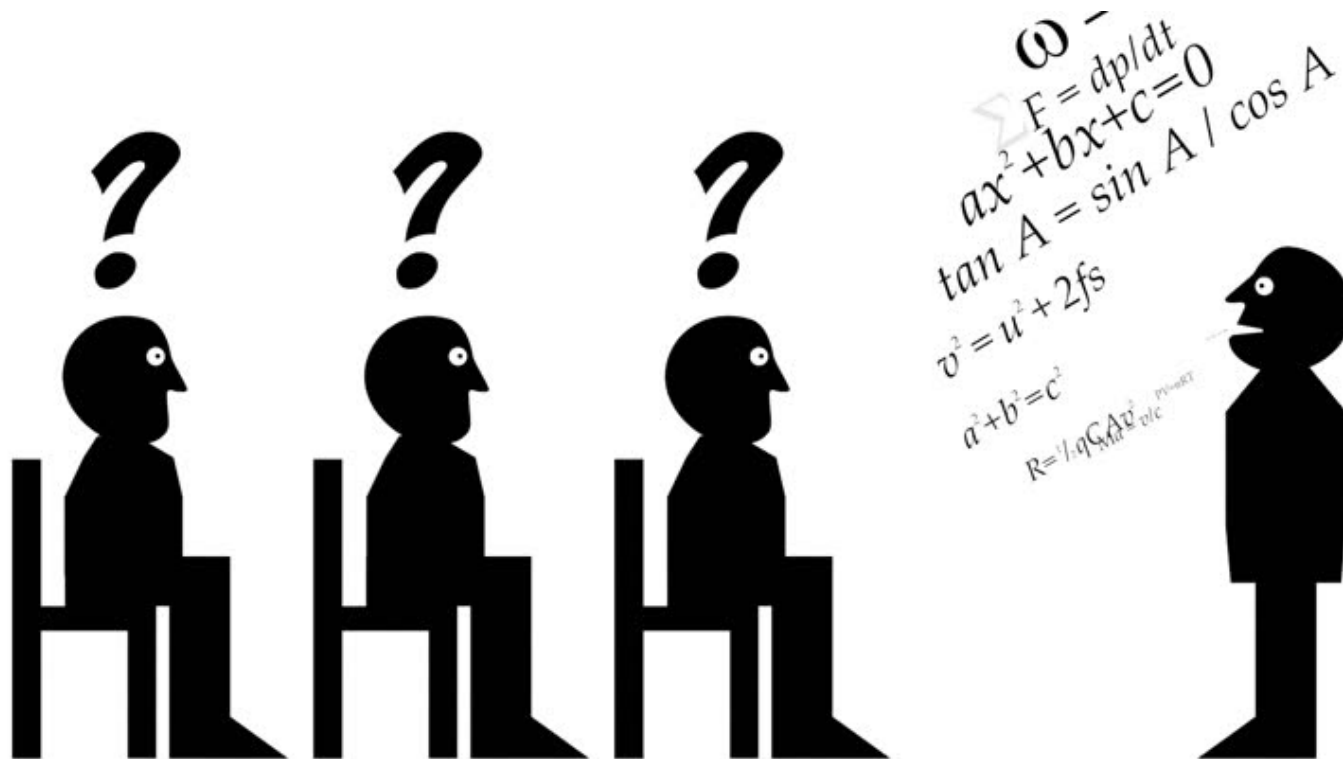
**Percentage of Texas 5<sup>th</sup> Grade Cohort Enrolled in Algebra 1 by 8<sup>th</sup> Grade Who Attained Advanced Standard on EOC Exam by Quintile on 2012 5<sup>th</sup> Grade STAAR Math**



## Key Take-Aways

- Higher levels of math ‘matter’
- Equity gap in accelerated math pathways for students
  - Low Income
  - Rural
  - Black and Hispanic
- With even our MOST prepared students under-represented
- Additional rigorous math helped mitigate equity gap

# Questions from the Audience



# The Intersection of District Practices & College and Career Readiness

## The Promise of Acceleration

- Higher levels of math “inoculate” low-income students to address income gaps
  - College level math drives degree completion and addresses workforce needs
- Algebra I enrollment in middle school allows students to take College Level math in HS
  - Addressing equity gap in 8<sup>th</sup> grade should lead to improvements in equity in college access and success
- Nearly all students in accelerated math pathway pass course and state assessment
  - More bubble students can be successful than are accelerated
- Even 44% of bubble students achieve Advanced Standard
  - With right supports, bubble students can thrive with acceleration

# Case Study of Acceleration in Central Texas

- Qualitative study of 13 ISDs
- One “big shot” in 6<sup>th</sup> grade for most districts
- Factors which contribute most to student success
  - **Teacher Quality**
    - Students reach Level 3 on STAAR
    - Strategies
    - Content knowledge
    - Differentiated instruction
  - **Teacher Preparation**
    - PD in Content
    - Pedagogy
  - **Course Curriculum**



# Promising Practices & Recommendations From Central Texas

## **Shasta Buchanan, Ed.D.**

Executive Director  
College & High School Relations  
Austin Community College

## **Debbie Plowman, Ph.D.**

Coordinator of Mathematics Initiatives  
Center for STEM Education  
University of Texas - Austin

## **Terrence Eaton, Ph.D.**

Associate Superintendent for Middle Schools  
Austin Independent School District

## How Do We Get There?

### District Policies to Drive Consistency Across Schools

- **Lever of Change:** 8<sup>th</sup> grade Algebra I
- **Early Math Focus:** Intentional supports in PK-3 to prepare for acceleration
- **Innovative Scheduling:** Use tutorial time (ES) or double-block instruction (MS) for time to support accelerated cohort
- **District-Wide Acceleration Policies:** Automatic enrollment for *well prepared* in 4<sup>th</sup> & 6<sup>th</sup> grade
  - “Opt out” policy for top 40% of academically prepared => Parents informed of option to decline
  - All other families notified of open enrollment; “opt in” policy
  - Acceleration beginning prior to 6<sup>th</sup> grade would take advantage of longer math instruction time in ES

## How Do We Get There?

### District Leadership – Curriculum and Alignment

- **Supports:** Redesign math curriculum & build “bridge programs” to support “bubble students”
- **Embedded Supports:** Develop formative (benchmark) assessments aligned with state standards => identify students in need of additional support
- **Measure Success:** Utilize data-driven approach to measure “success” of acceleration
  - % 8<sup>th</sup> graders in accelerated pathway  
(should match campus demographics)
  - % accelerated reaching CCR standards on state assessment  
(low income vs. non-low income)
  - % of students taking math BEYOND Algebra II  
(low income vs. non-low income)

# Regional Priorities Across the State

## Brainstorming

Individual: What are the top 3 priorities for YOUR local region?

Table Conversation:

1. Do you see any common themes across regions?
2. What should the Center for STEM Education's role be in supporting regional capacity-building?

## Share Out

- Select one priority and a table leader to report out
- Table Leader: Share out top priority with group

# Thank You!

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The conclusions of this research do not necessarily reflect the opinions or official position of the Texas Education Agency, the Texas Higher Education Coordinating Board, or the State of Texas.

