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High School Mathematics Mastery Predicts Higher Education Outcomes

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Mathematics Mastery

- Analysis about outcomes associated with different levels of mathematics mastery
- Mastery means *passing both semesters* of course with 70% or above
- Different than Texas definition
  - Passing = average grade across both semesters 70% or above
  - May not represent mastery
- Students with less than Algebra II may have taken Algebra II but not passed both semesters

Source: E3 Alliance analysis of data at the UT Austin Education Research Center

Research Questions

- For each math course, what share of students mastered it as their highest math?
- What is the relationship between the highest level of math a student masters and later educational outcomes?
  - Overall and by subpopulation
- To what degree does mastering a more rigorous math course increase the odds of these outcomes?
  - Especially for higher education completion, both overall and in STEM fields

Source: E3 Alliance analysis of data at the UT Austin Education Research Center

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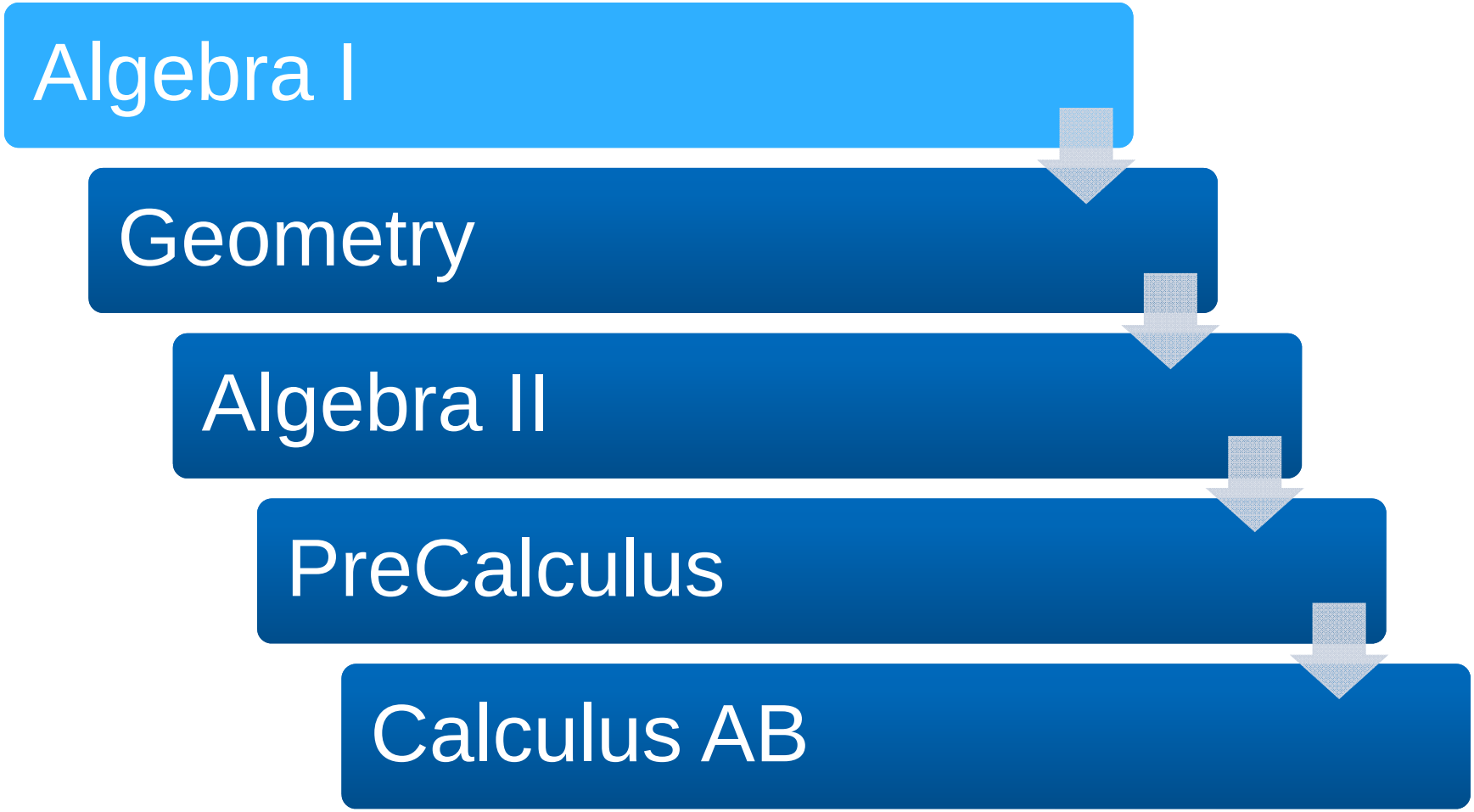
Key Take Aways

- Vastly more students master Precalculus with 4X4; Low income mastery rates doubled
  - Only small improvement in low income IHE enrollment rates
- Higher levels of math beyond Algebra II 'matter'
  - For CCR & IHE enrollment, Precalculus very important
  - For persistence, transfer, IHE completion, and STEM degrees, both Precalculus and an AP course (Calculus) important
- Full time enrollment even larger effect on 2nd year persistence than highest math mastered
- 9% of the 2004 9th Grade Cohort (enrolled in HS 4 years) obtained a STEM degree

Source: E3 Alliance analysis of data at the UT Austin Education Research Center

Typical Math Course Sequence



Source: E3 Alliance analysis of data at the UT Austin Education Research Center

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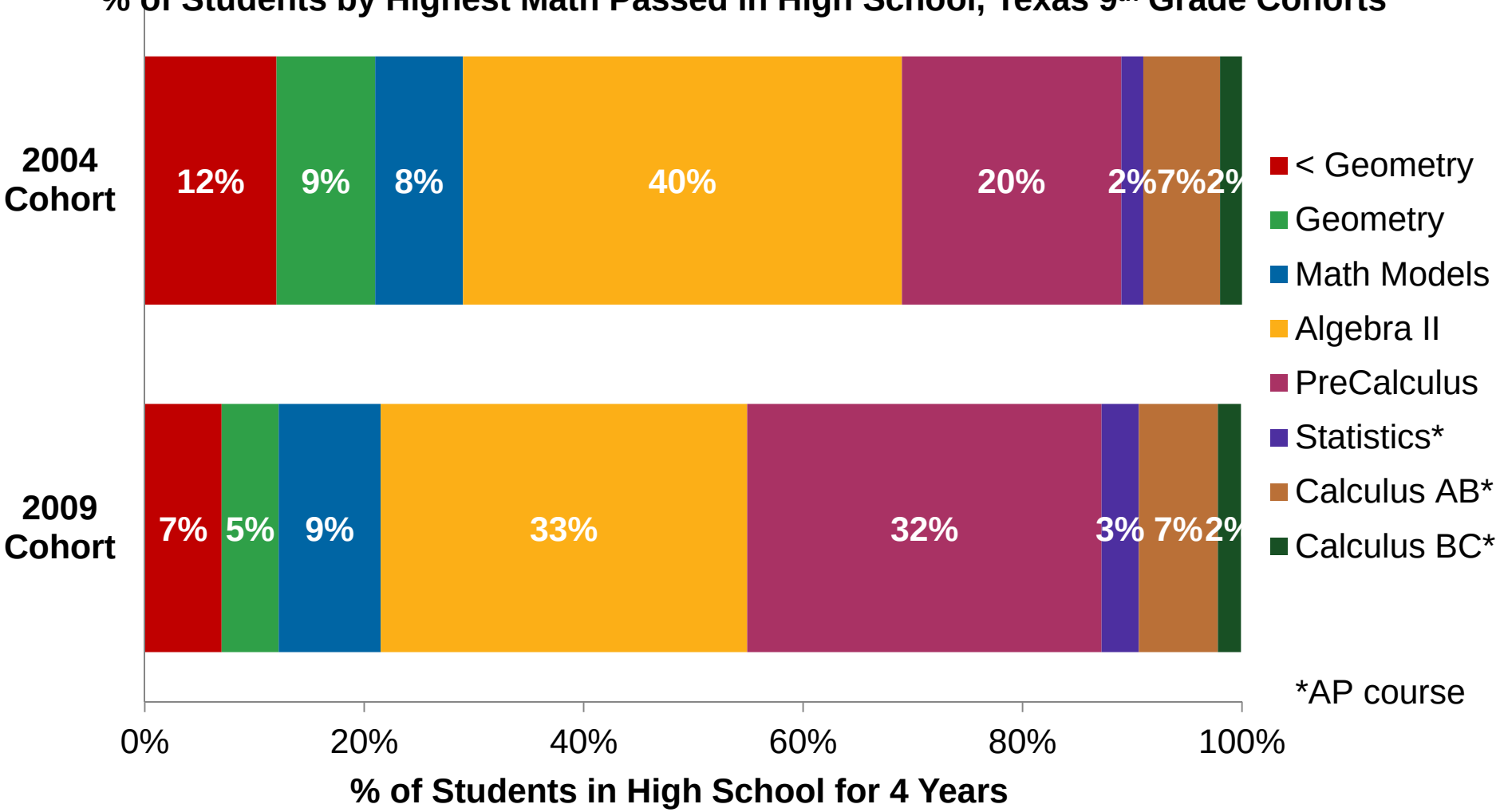
Higher Proportion of 2009 Cohort Mastered PreCalculus as Highest Math

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



Source: E3 Alliance analysis of PEIMS data at the UT Austin Education Research Center

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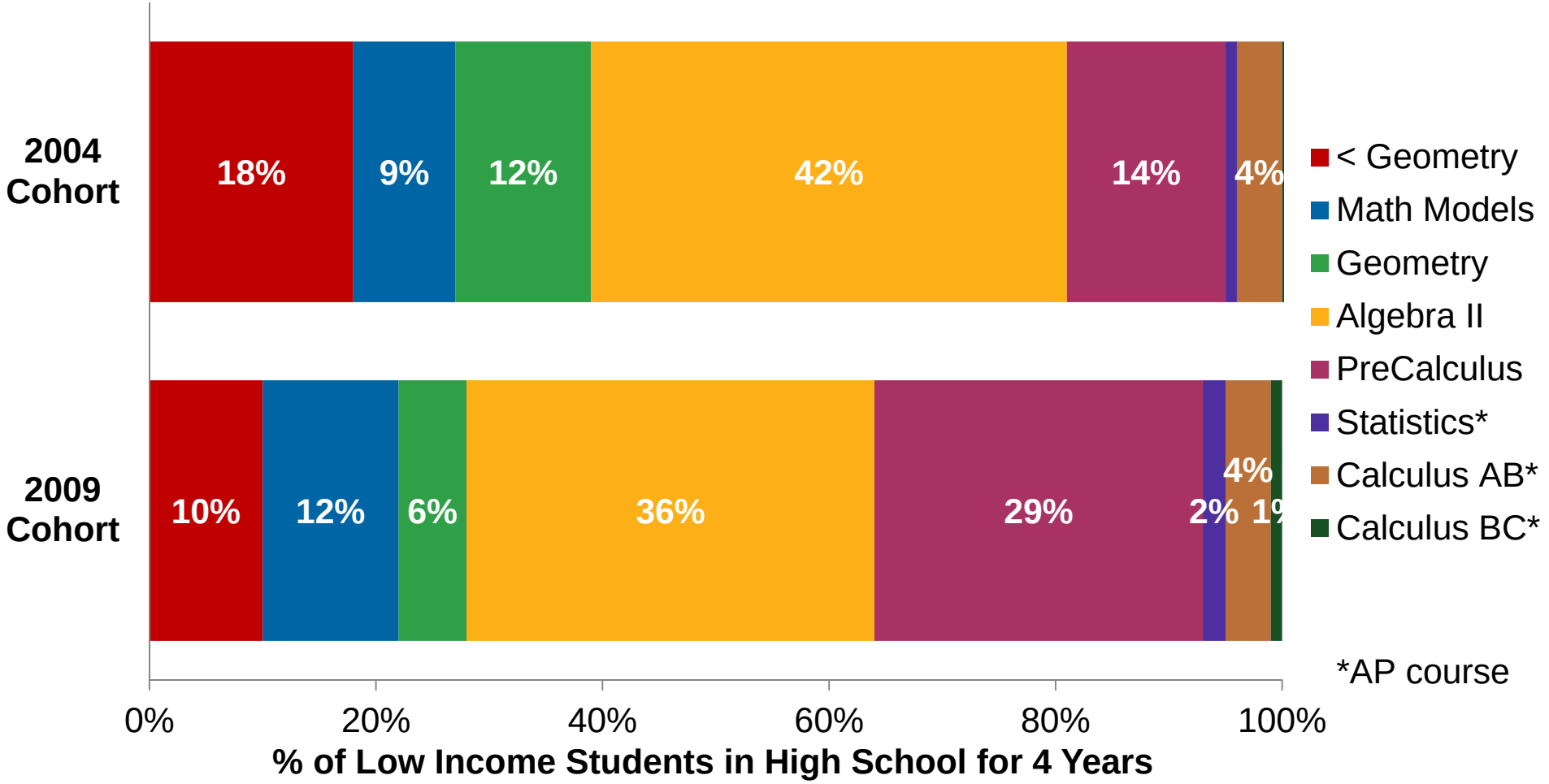
Low Income Student Rate Doubled for PreCalculus as Highest Mastery

Percent of Low Income Students by Highest Math Passed in High School, Texas 9th Grade Cohort



Source: E3 Alliance analysis of PEIMS data at the UT Austin Education Research Center

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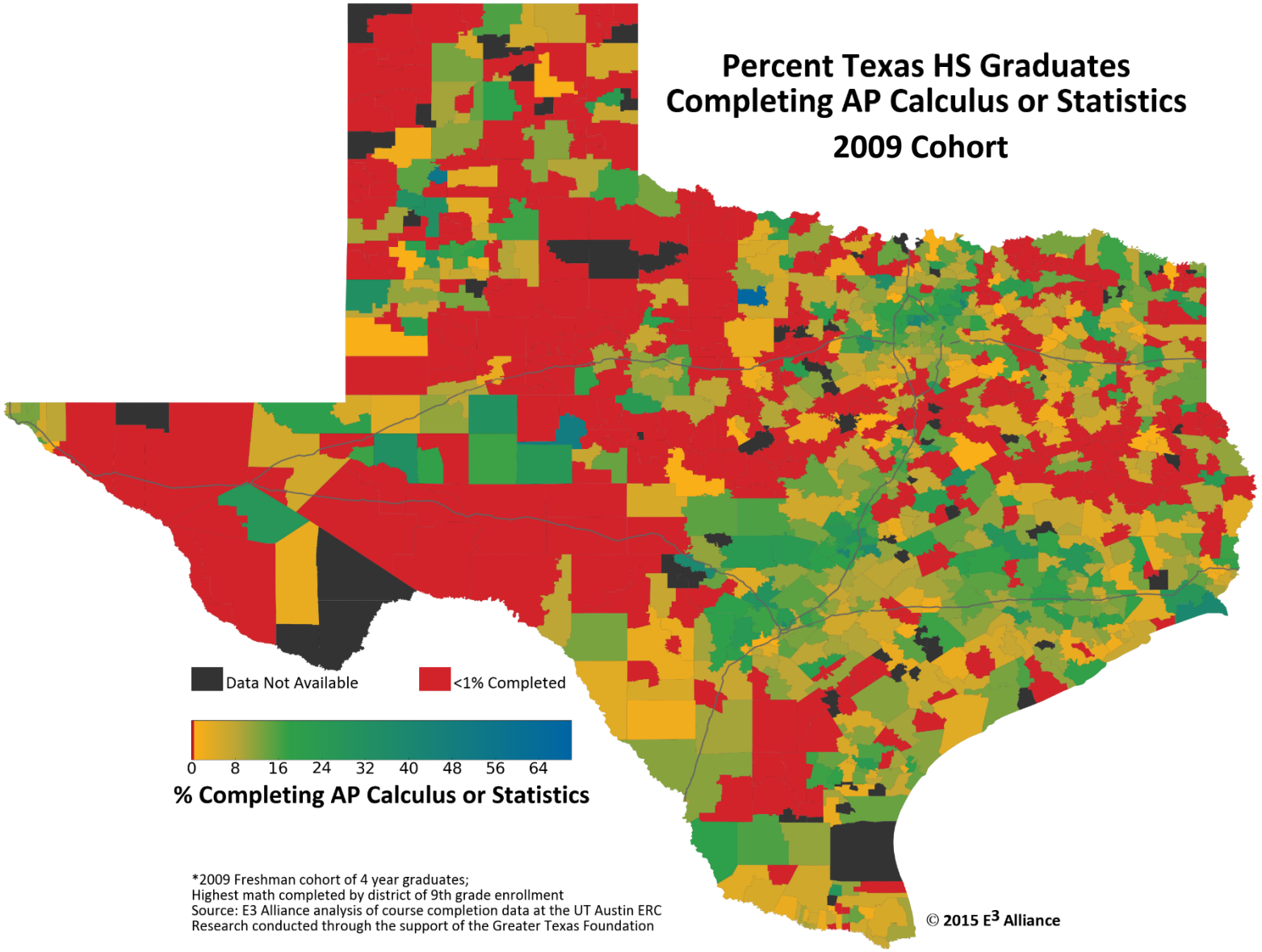
Highest AP Mastery Generally in Urban Areas



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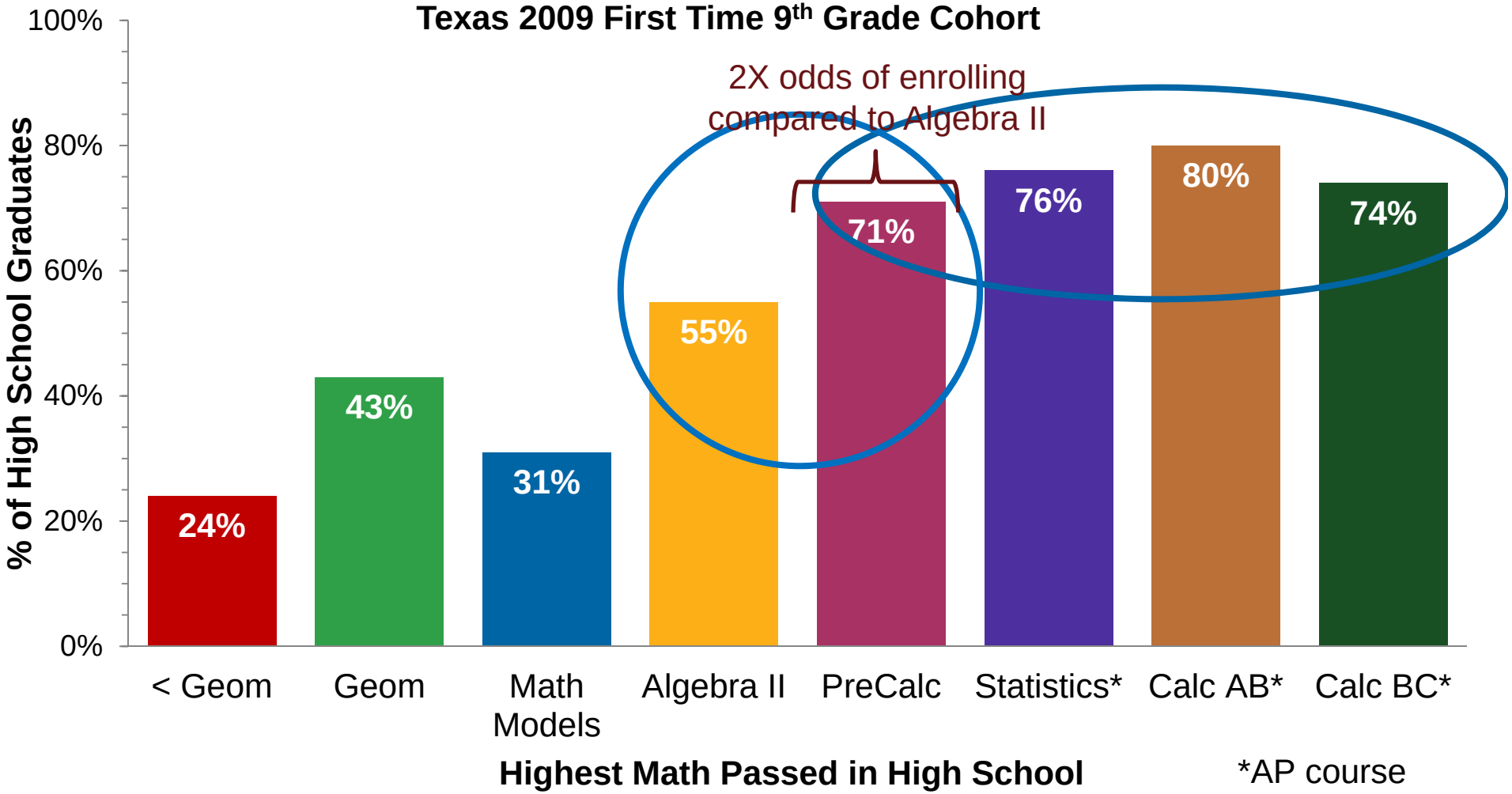
Largest Increase in Texas Higher Ed Enrollment Rates Between Algebra II and PreCalculus

Higher Education Enrollment Rates of Graduates by Highest Math, Texas 2009 First Time 9th Grade Cohort



Odds ratios take into account demographics & prior achievement; 2004 cohort
Source: E3 Alliance analysis of data at the UT Austin Education Research Center

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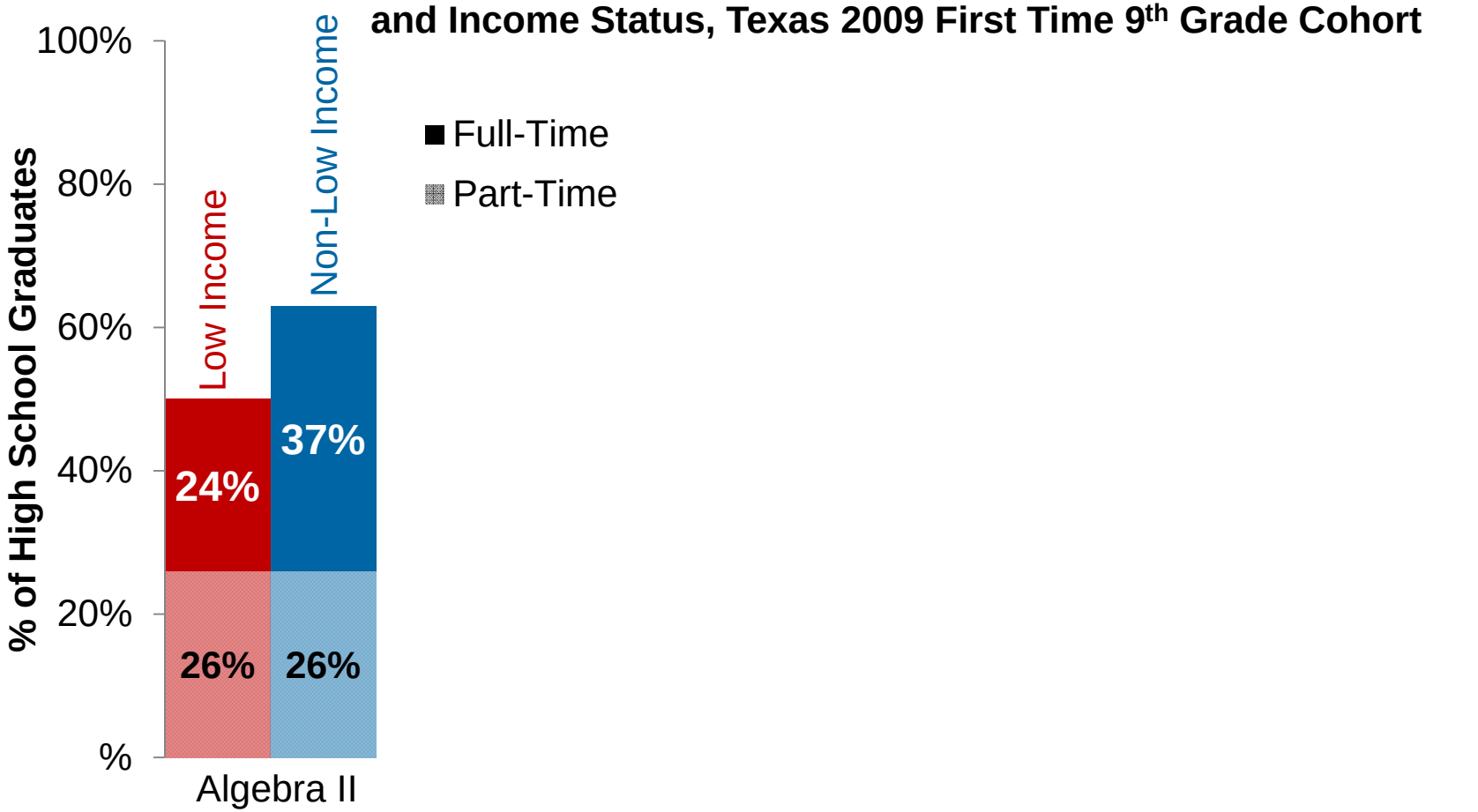
As HS Math Rigor Increases, More Students Enroll and More Enroll Full Time

Full-and-Part-Time Texas Higher Ed Enrollment by Highest Math and Income Status, Texas 2009 First Time 9th Grade Cohort



Highest Math Passed in High School

*AP course

Source: E3 Alliance analysis of data at the UT Austin Education Research Center

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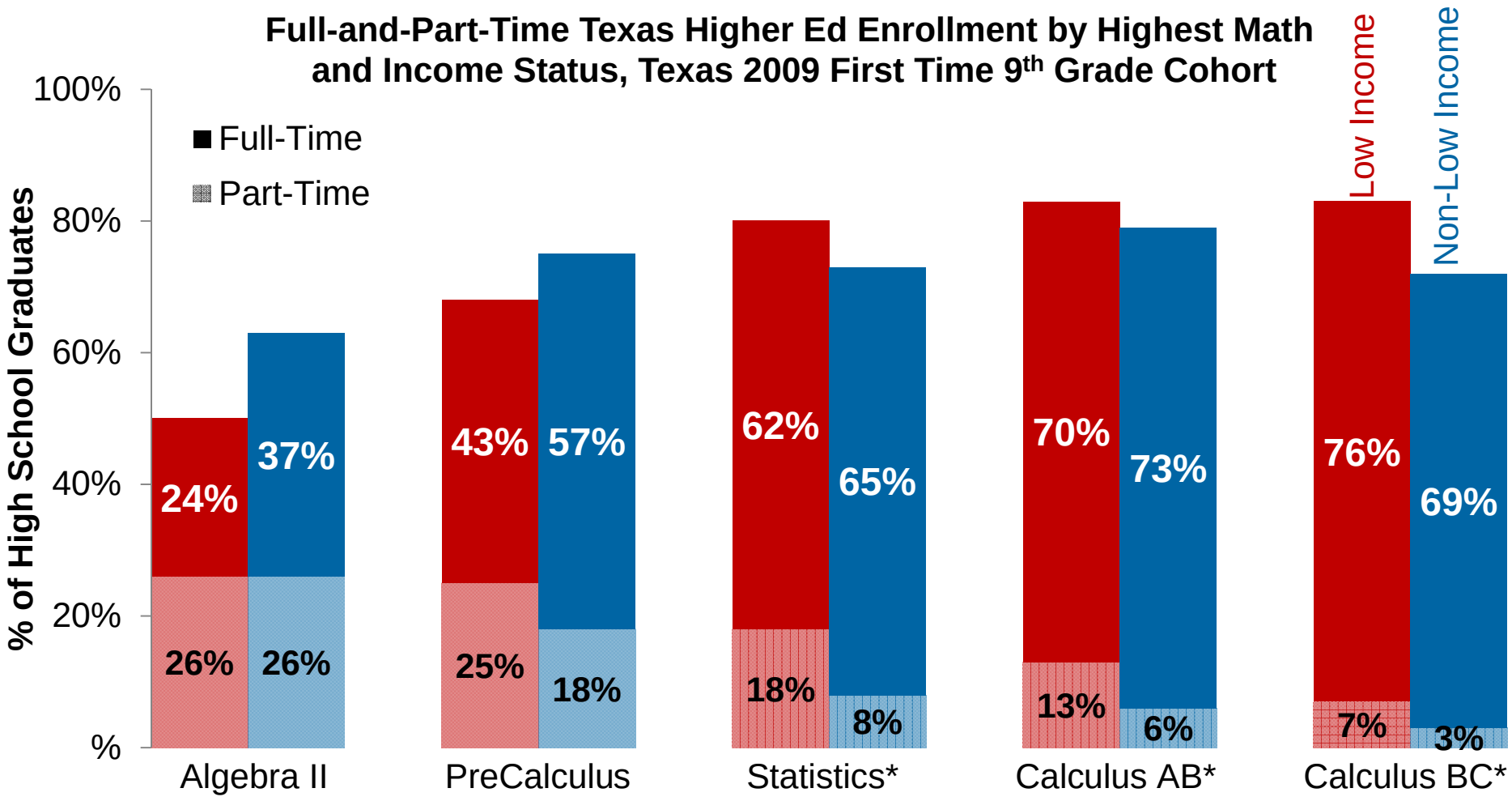

Source: E3 Alliance analysis of data at the UT Austin Education Research Center

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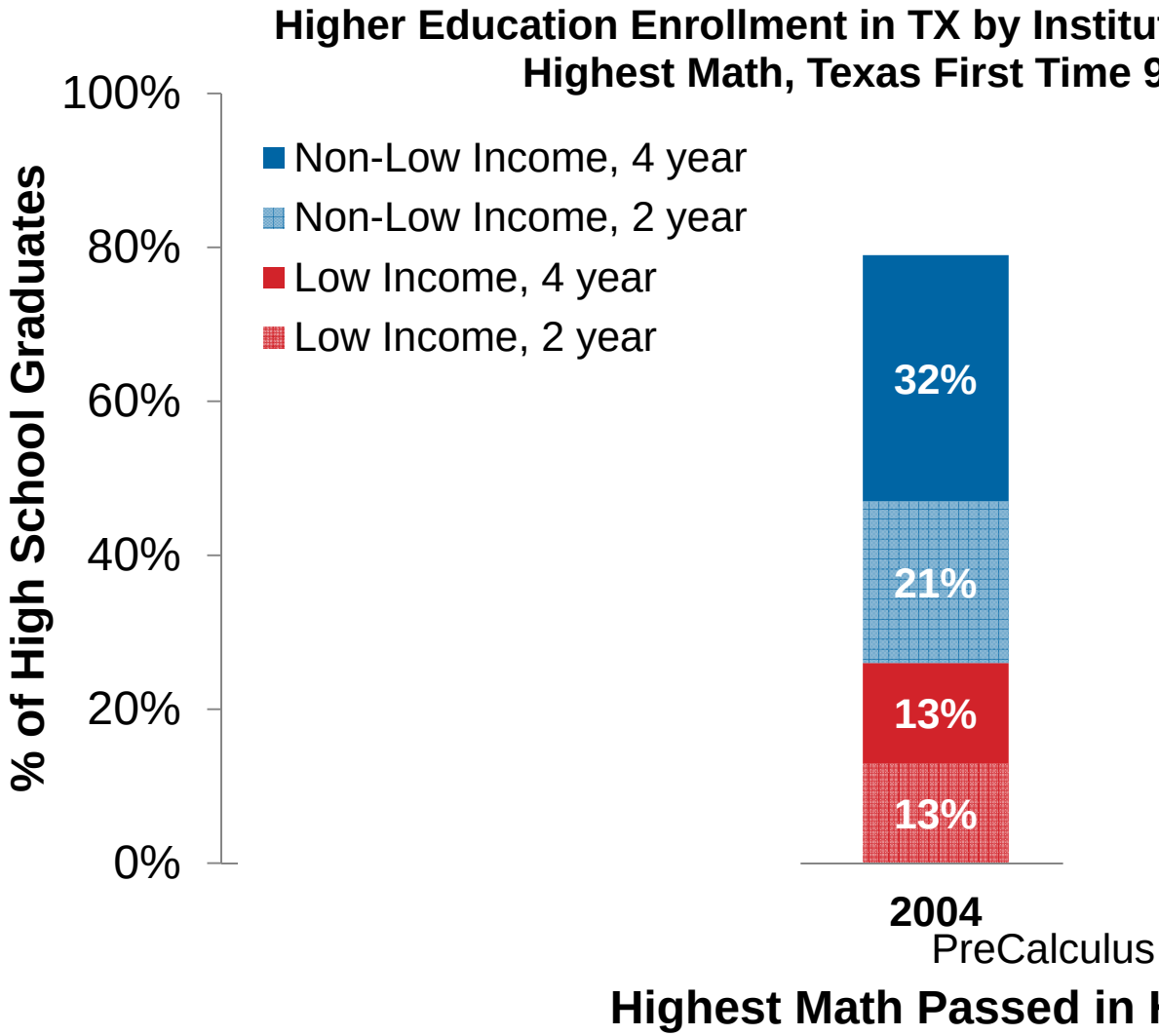
With 4X4, Small Increase in Low Income Students with PreCalc Mastery Enrolling at 4 Year Higher Ed Institutions



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*AP course

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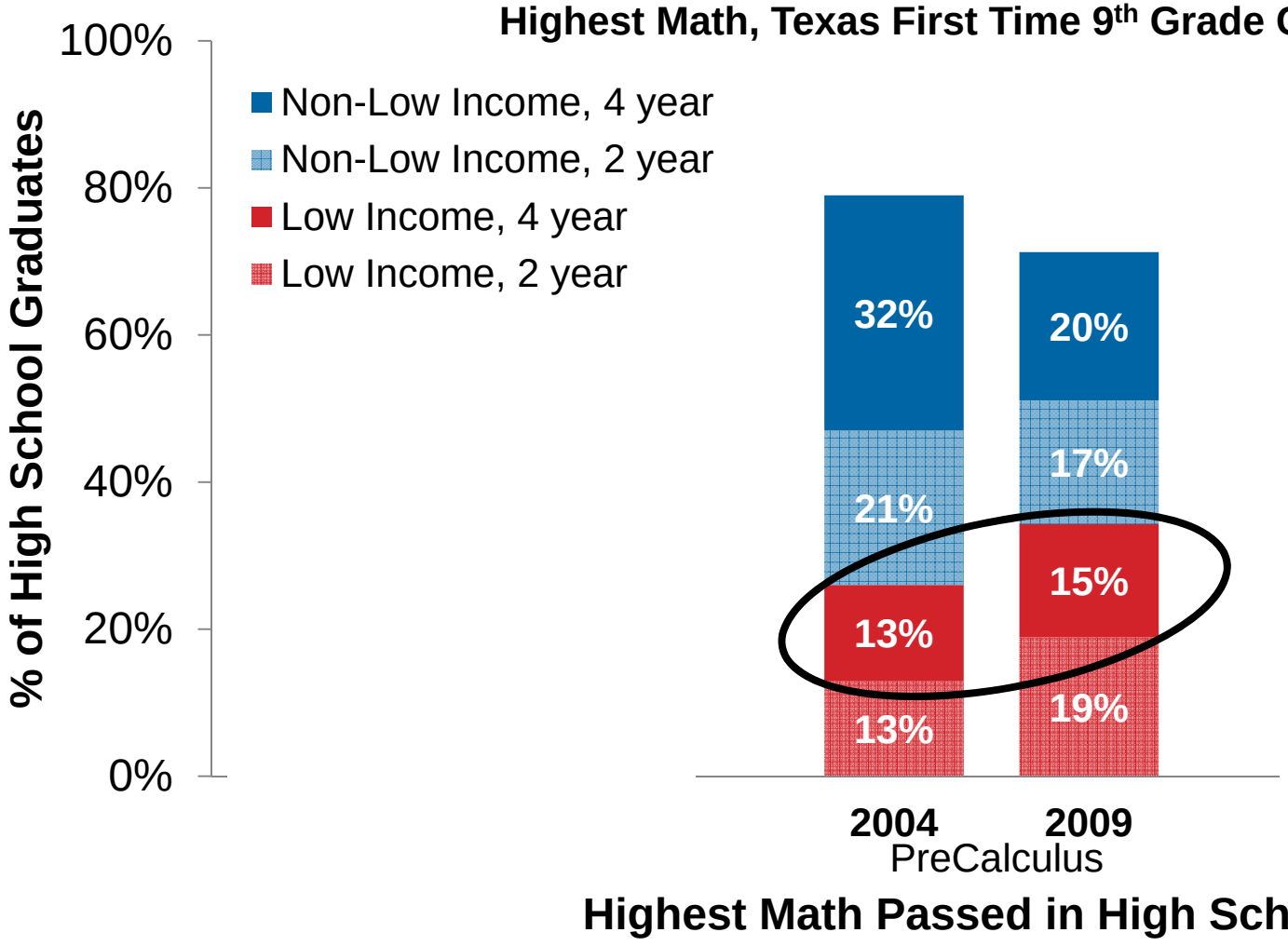
With 4X4, Small Increase in Low Income Students with PreCalc Mastery Enrolling at 4 Year Higher Ed Institutions

Higher Education Enrollment in TX by Institution Type, Income Status, and Highest Math, Texas First Time 9th Grade Cohorts



Source: E3 Alliance analysis of data at the UT Austin Education Research Center

*AP course

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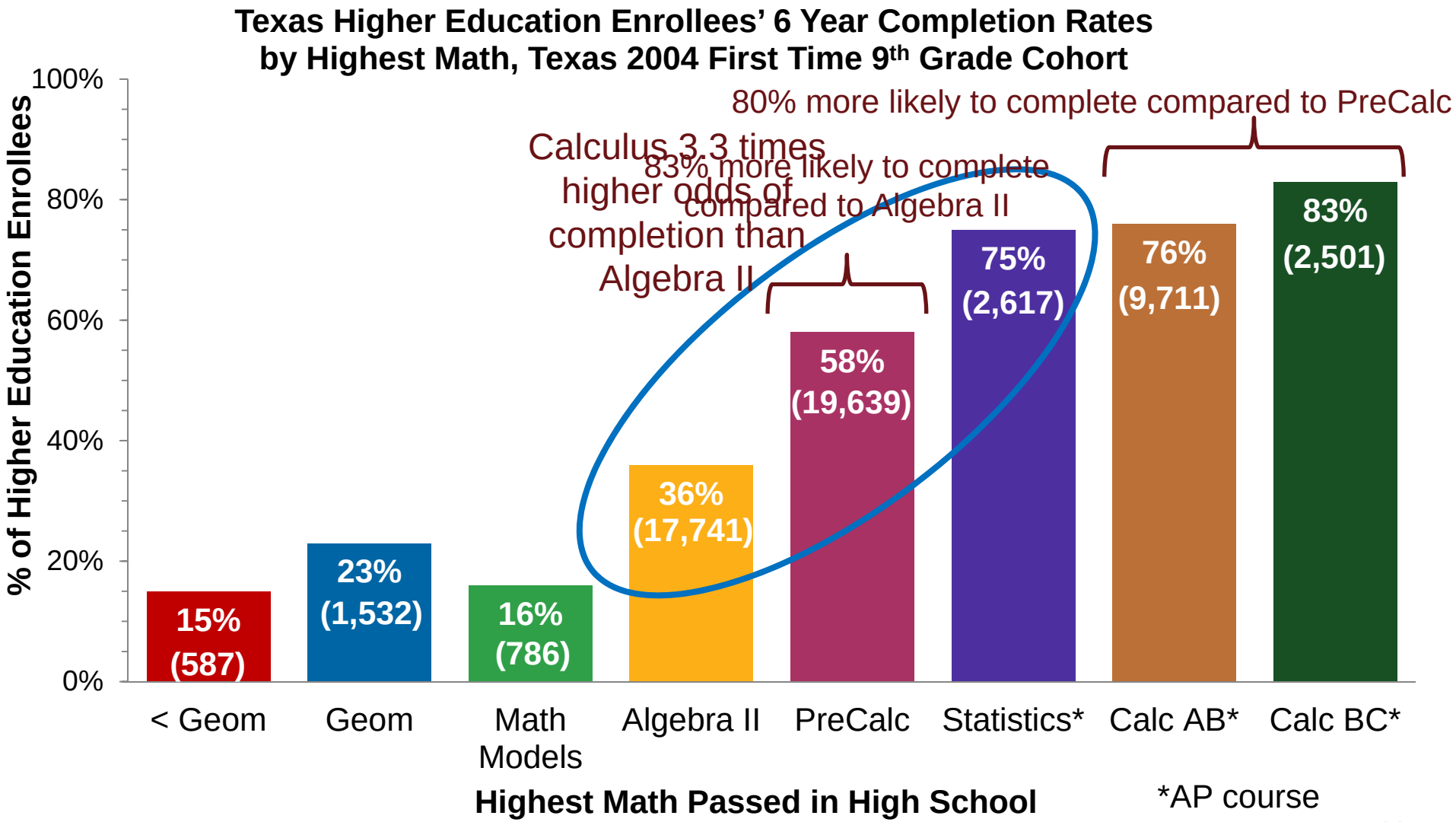
3 in 4 Higher Ed Enrollees with AP for Highest Math Completed



Odds ratios take into account demographics & prior achievement; 2004 cohort
Source: E3 Alliance analysis of data at the UT Austin Education Research Center

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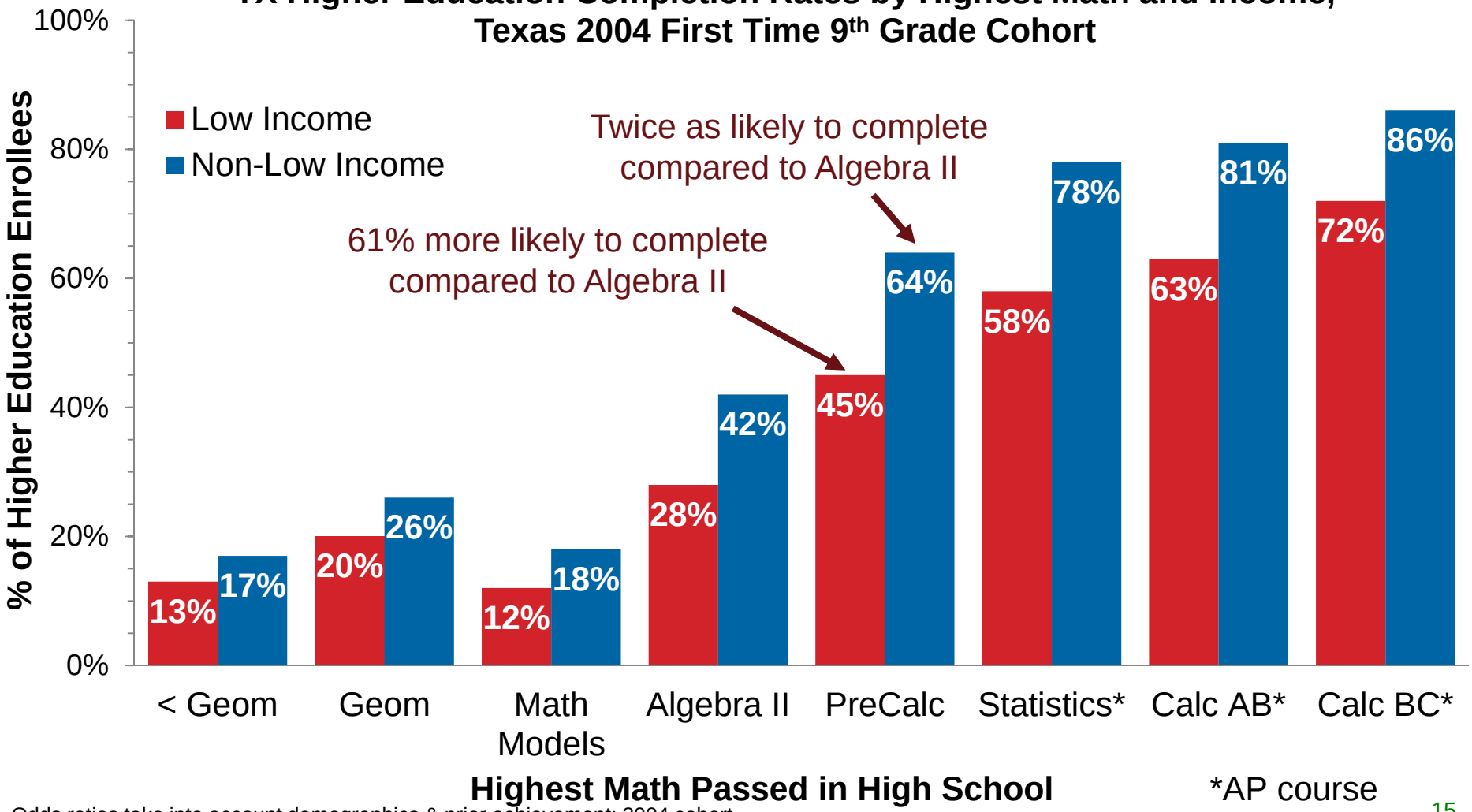
Large Completion Gaps by Income Exist Even with Highest Level of Math Mastery

TX Higher Education Completion Rates by Highest Math and Income, Texas 2004 First Time 9th Grade Cohort



Odds ratios take into account demographics & prior achievement; 2004 cohort
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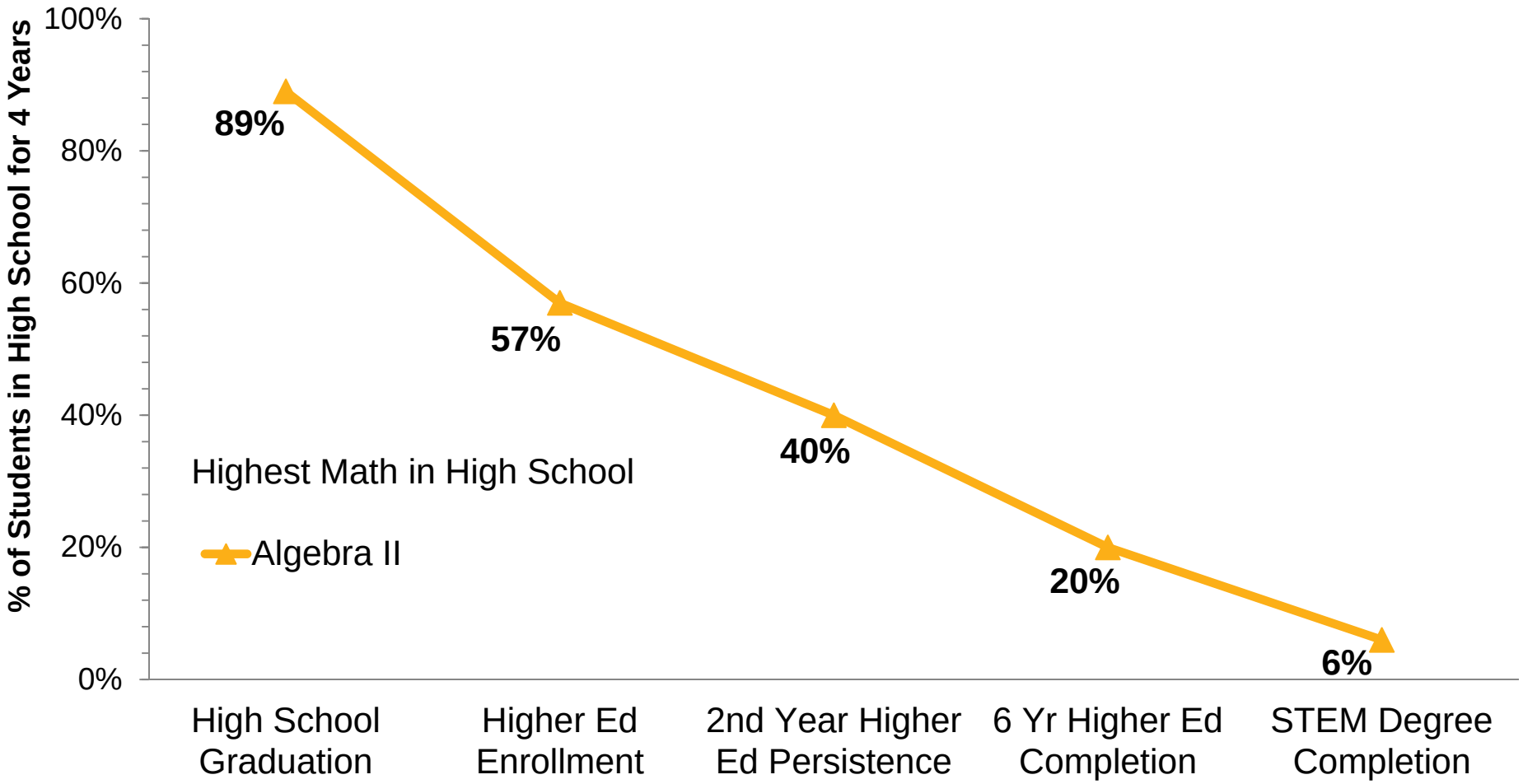
20% With Algebra II as Top Math Complete Higher Ed in 6 Yrs

Outcomes of Students in HS for 4 Years, Texas 2004 First Time 9th Grade Cohort



Source: E3 Alliance analysis of data at the UT Austin Education Research Center

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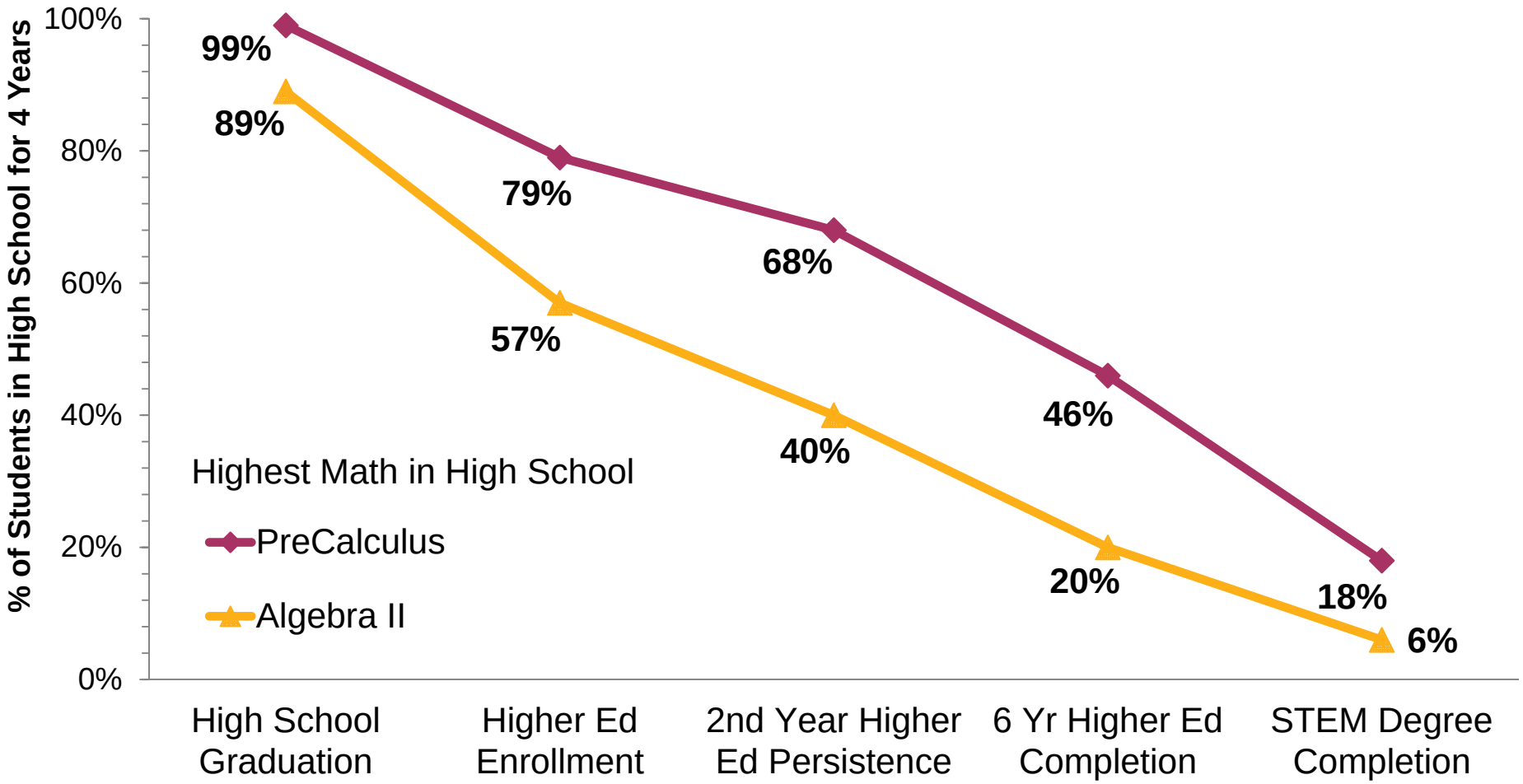
Gap by Highest Math Remains through STEM Completion

Outcomes of Students in HS for 4 Years, Texas 2004 First Time 9th Grade Cohort



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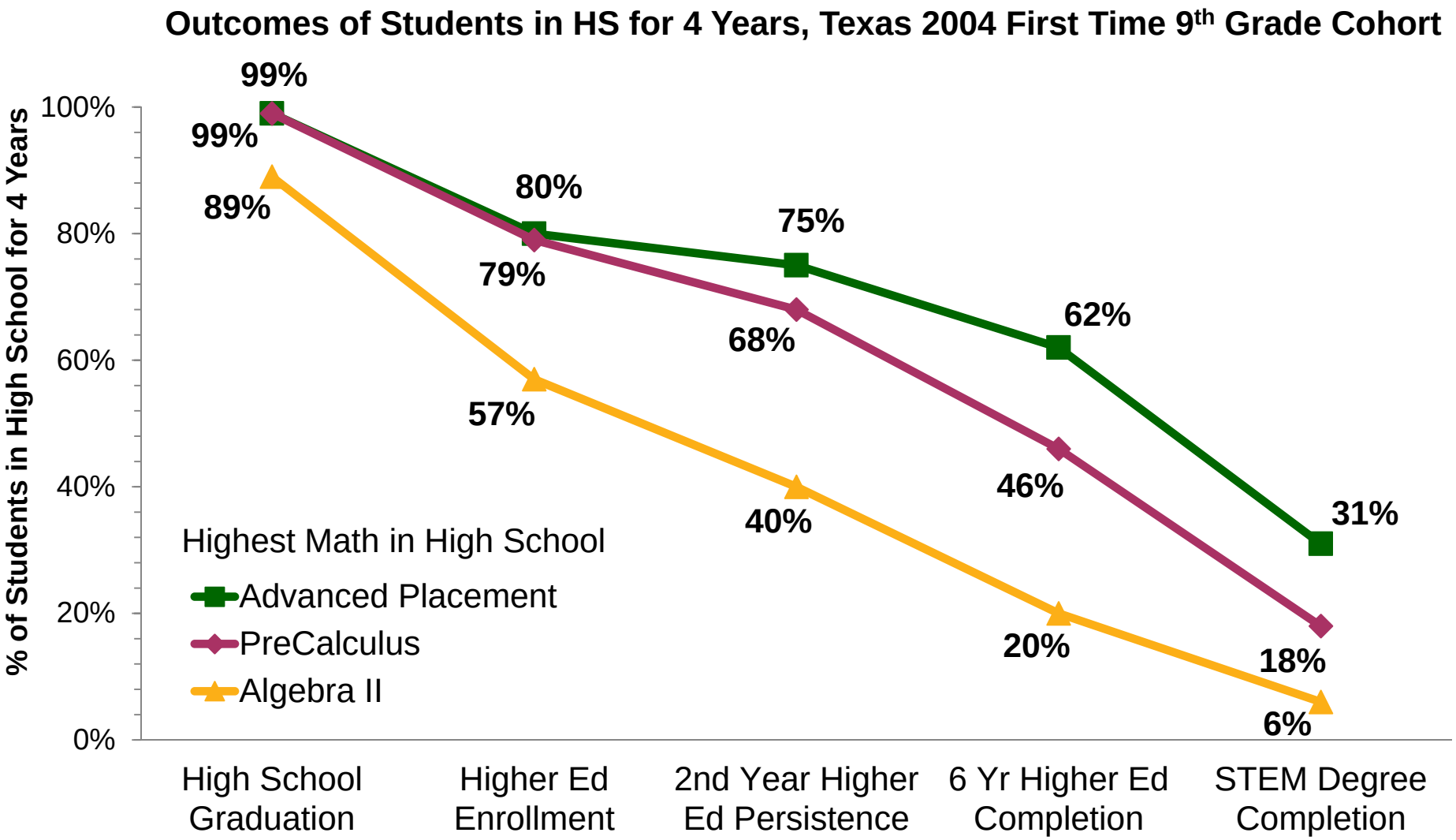
16 Pt Gap Between PreCalc and APs for Higher Ed Completion



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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.