

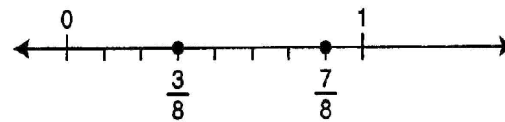
Education in a Global Context

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Elementary Students' Performance on a Fractions Problem

4. Which fraction is located between $\frac{3}{8}$ and $\frac{7}{8}$ on the number line?



A.

$$\frac{3}{8}$$

B.

$$\frac{7}{8}$$

C.

D.

Grade 3	Grade 4	Grade 5
19.1	39.8	50.8

Elementary & Middle School Students' Performance on a Fractions Problem

20. What is the value of $\frac{4}{5} - \frac{1}{3} - \frac{1}{15}$?

A. $\frac{4}{5} - \frac{1}{3} - \frac{1}{15}$

B.

C.

D.

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
14.1	21.2	16.7	28.4	37.7	51.2

E.

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Middle School Students' Performance on an Algebra Problem

16. If $\frac{6}{7} \left(2x - 5 \right) + 5 - (x + 5) = 2(3 - x)$ what does x equal?

B. 1

C. 4

D. 3

Grade 6	Grade 7	Grade 8
19.9	31.5	31.6

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Instructional Content Constructs

❖ Curricular Coherence

■ Curricular Structure

❖ Curricular Focus

■ Exposure Time (OTL)

❖ Curricular Rigor

■ Level of Cognitive Complexity

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Top Achieving Countries' Mathematics Curriculum

Topic	Grade							
	1	2	3	4	5	6	7	8
Whole Number: Meaning	■	■	■	■	■			
Whole Number: Operations	■	■	■	■	■	■	■	
Measurement Units	■	■	■	■	■	■	■	
Common Fractions			■	■	■	■	■	
Equations & Formulas			■	■	■	■	■	■
Data Representation & Analysis			■	■	■	■	■	■
2-D Geometry: Basics			■	■	■	■	■	■
2-D Geometry: Polygons & Circles			■	■	■	■	■	■
Measurement: Perimeter, Area & Volume			■	■	■	■	■	■
Rounding & Significant Figures			■	■	■	■	■	■
Estimating Computations			■	■	■	■	■	■
Whole Numbers: Properties of Operations			■	■	■	■	■	■
Estimating Quantity & Size			■	■	■	■	■	■
Decimal Fractions			■	■	■	■	■	■
Relation of Common & Decimal Fractions			■	■	■	■	■	■
Properties of Common & Decimal Fractions			■	■	■	■	■	■
Percentages			■	■	■	■	■	■
Proportionality Concepts			■	■	■	■	■	■
Proportionality Problems			■	■	■	■	■	■
2-D Geometry: Coordinate Geometry			■	■	■	■	■	■
Geometry: Transformations			■	■	■	■	■	■
Negative Numbers, Integers, & Their Properties			■	■	■	■	■	■
Number Theory			■	■	■	■	■	■
Exponents, Roots & Radicals			■	■	■	■	■	■
Exponents & Orders of Magnitude			■	■	■	■	■	■
Measurement: Estimation & Errors			■	■	■	■	■	■
Constructions Using Straightedge & Compass			■	■	■	■	■	■
3-D Geometry			■	■	■	■	■	■
Geometry: Congruence & Similarity			■	■	■	■	■	■
Rational Numbers & Their Properties			■	■	■	■	■	■
Patterns, Relations & Functions			■	■	■	■	■	■
Proportionality: Slope & Trigonometry			■	■	■	■	■	■

▲ Intended by 4 out of the 6 top-achieving countries
 ● Intended by all but one of the top-achieving countries (5 out of 6).
 ■ Intended by all of the top-achieving countries.

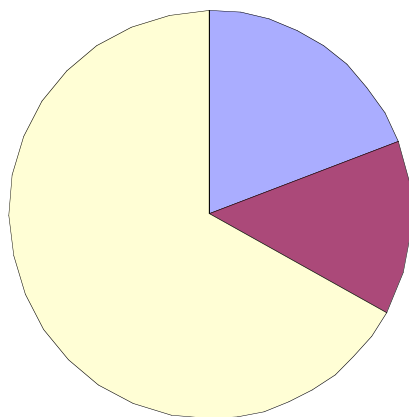
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21 U.S. States' Mathematics Curriculum

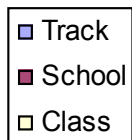
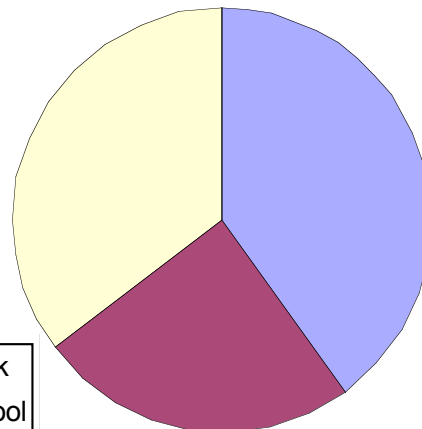
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Variation in the mathematics content index (IGP) in schools having multiple tracks and schools having single tracks

Single-Track Schools



Multiple-Track Schools



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High School Students' Performance on a Functions Problem

The inverse of a function is a logarithmic function in the form $y = \log_b x$. Which equation represents the original function?

- A. $y = b^x$
- B. $y = bx$
- C. $x = b^y$
- D. $by = x$

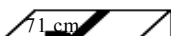
Grade 9	Grade 10	Grade 11	Grade 12
17.0	27.9	28.2	37.5

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High School Students' Performance on a Mathematics Literacy Problem

29. Stu wants to wrap some ribbon around a box as shown below and have 25 centimeters left to tie a bow.

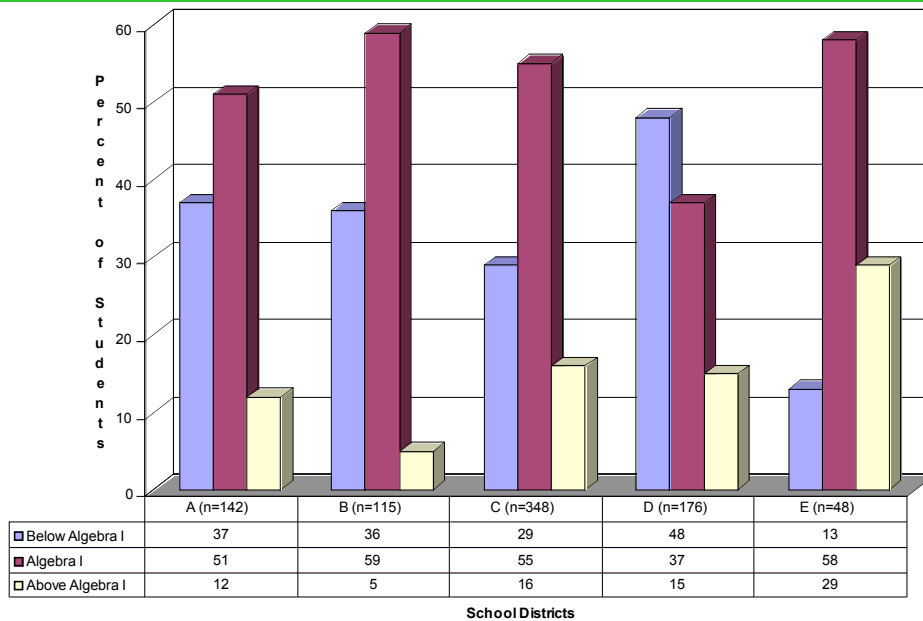
How long a piece of ribbon does he need?

- A. 46 cm
- B. 77 cm
- C. 65 cm
- D. 

Grade 9	Grade 10	Grade 11	Grade 12
38.0	41.0	43.3	50.2

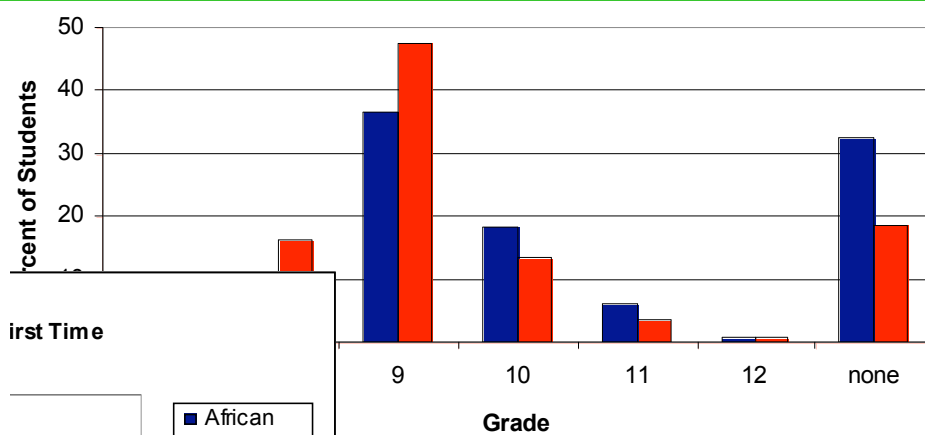
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Level of First Mathematics Course in High School

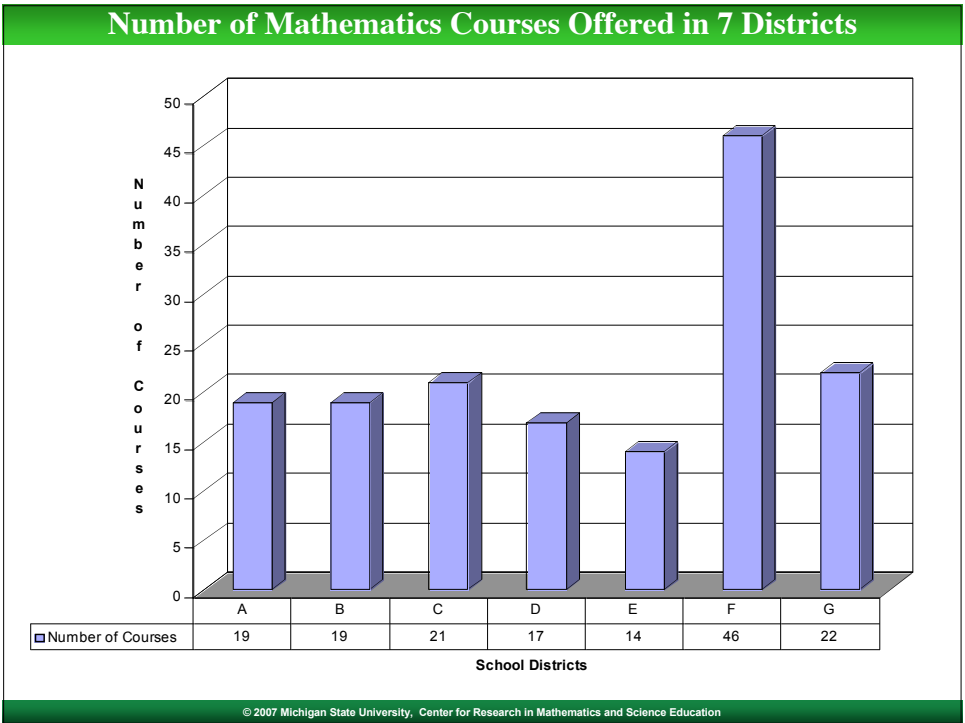
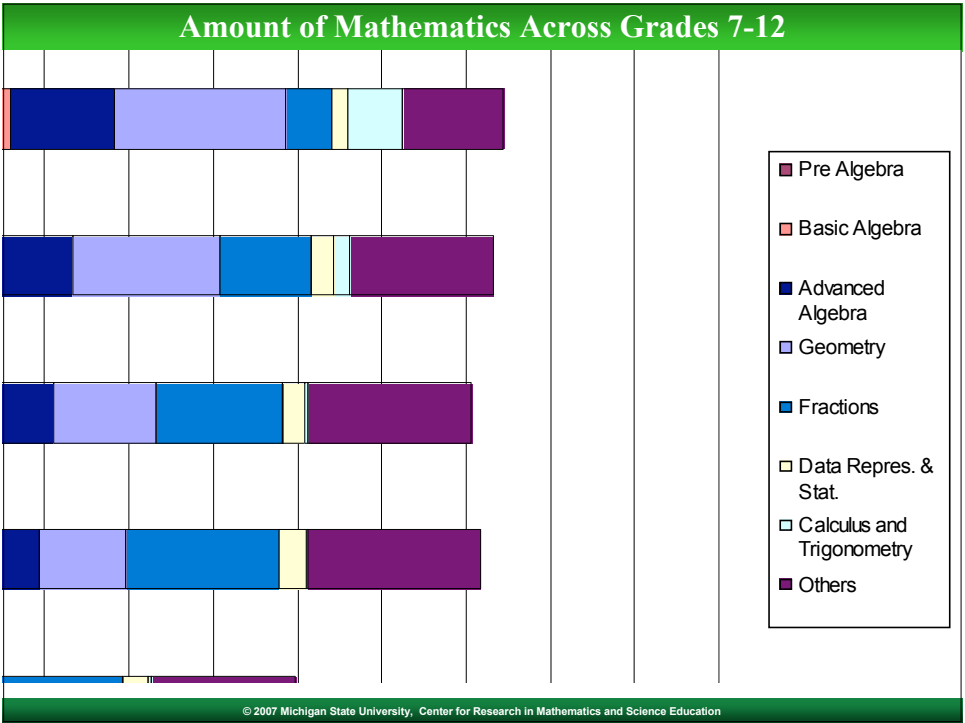


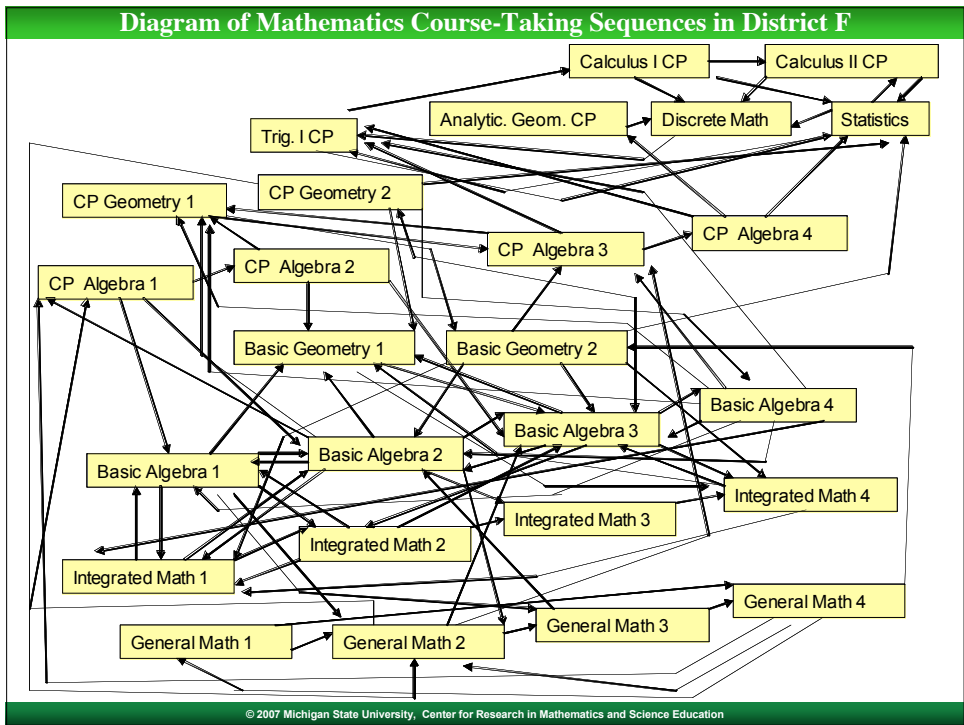
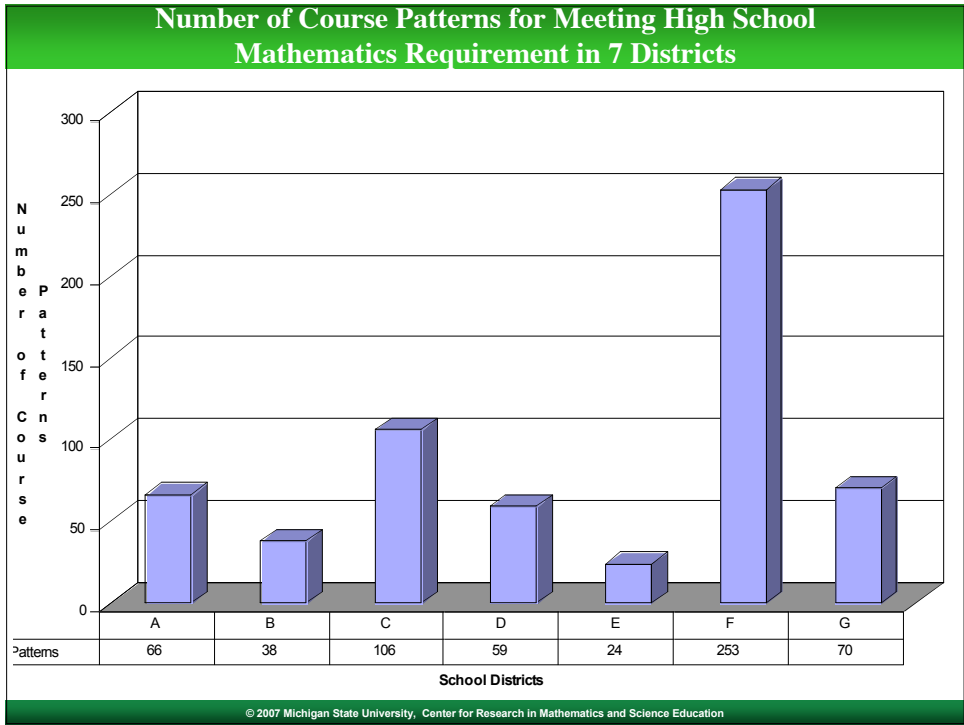
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Percent of Students Taking Algebra I for the First Time



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Minimal Standards?

- One course in each:
Mathematics, Biology, Chemistry, Physics
- **Algebra II/Biology/Chemistry/Physics**
 - Less than 30 % of ALL Students
 - Less than 5 % of Voc/Tech Students
 - About 15 % of General Academic Students
 - About 40 % of College Preparatory Students

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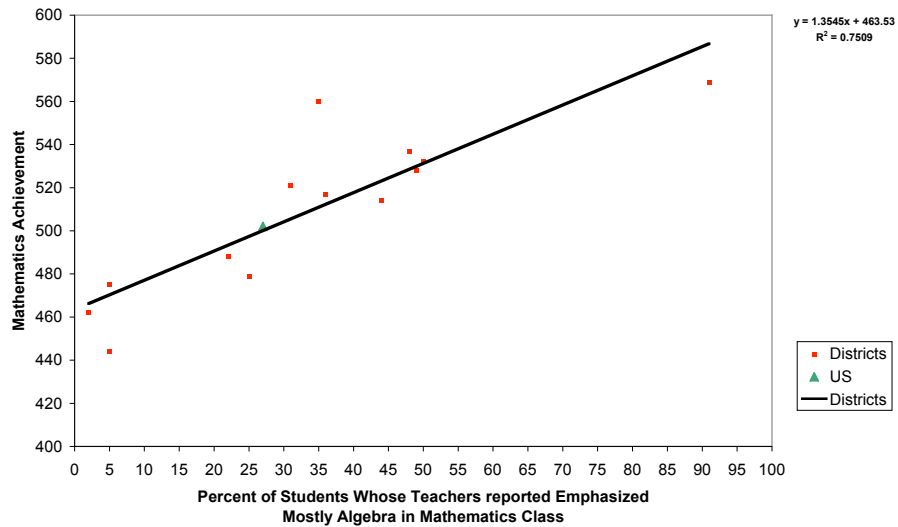
Minimal Standards?

- One course in each:
Mathematics, Biology, Chemistry, Physics
- **Algebra II/Biology/Chemistry/Physics**
 - Less than 20 % of ALL Black Students
 - Less than 5 % of Black Voc/Tech Students
 - About 11 % of Black General Academic Students
 - About 32 % of Black College Preparatory Students

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Relationship between Algebra Instruction and Student Achievement

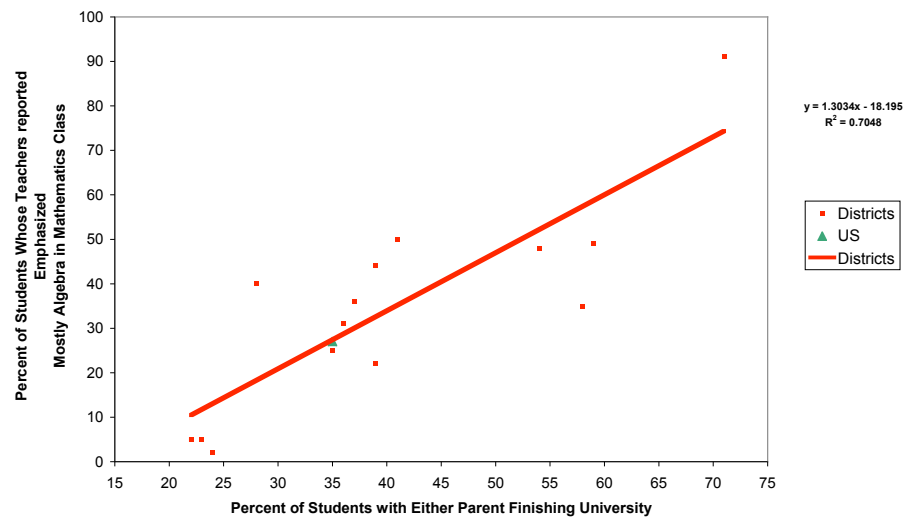
1999 TIMSS-R Districts



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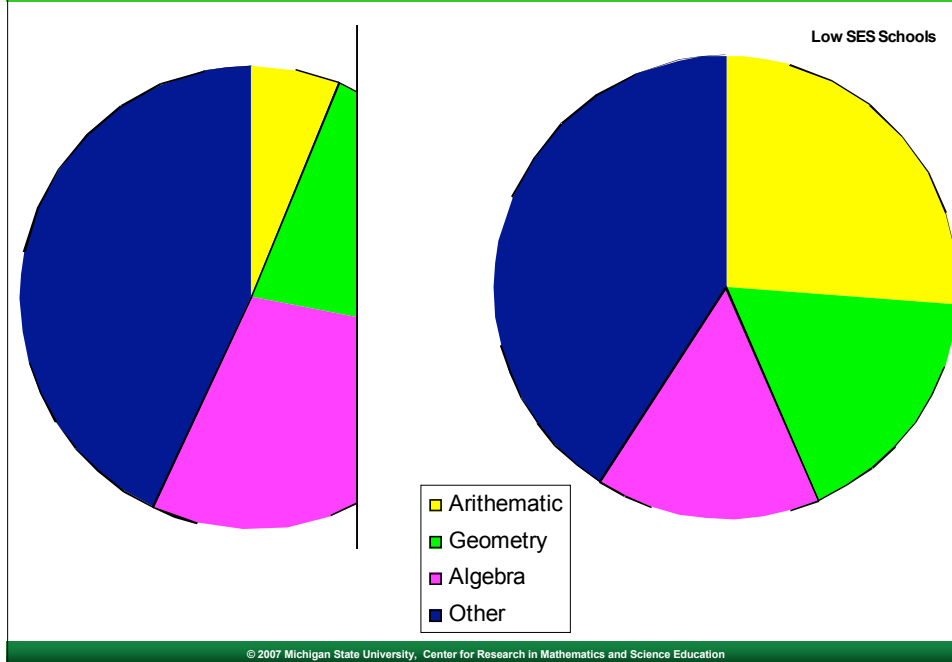
Relationship between Parents' Education and Algebra Instruction

1999 TIMSS-R Districts

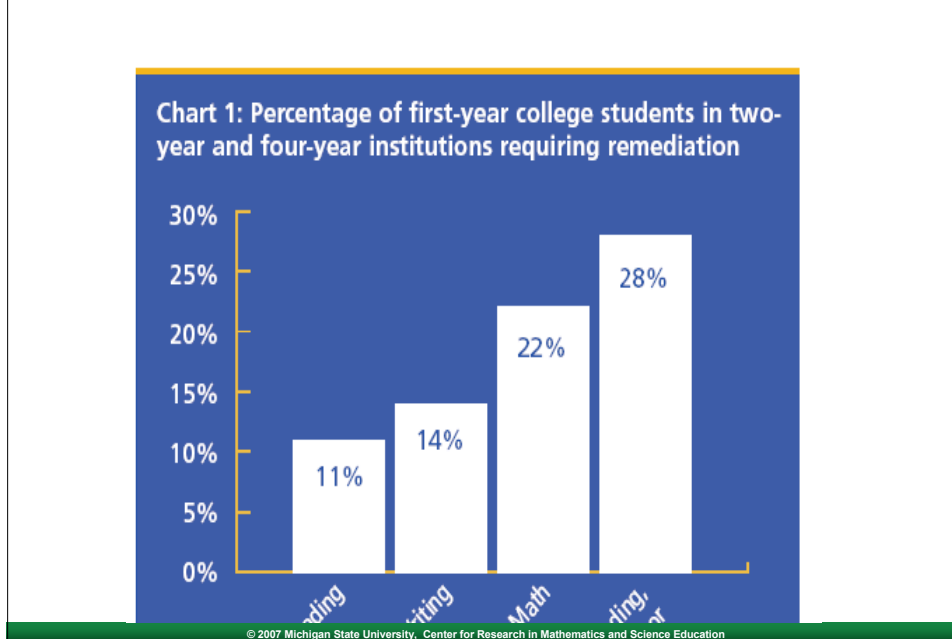


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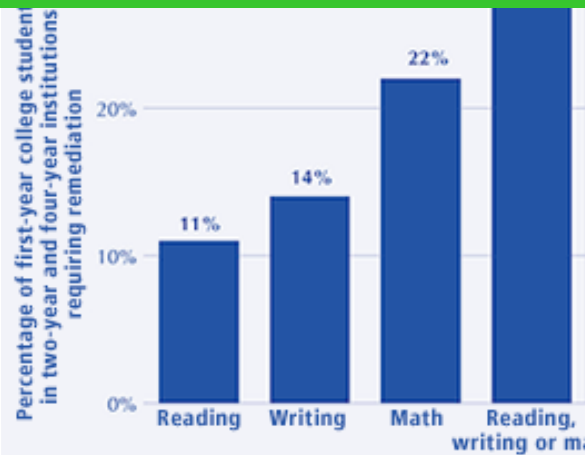
Teachers Coverage of Mathematics Topics in Two Types of Schools



Percent of First Year College Students in 2-year and 4-year Institutions Requiring Remediation



Those who require remediation in college often fail to earn a degree



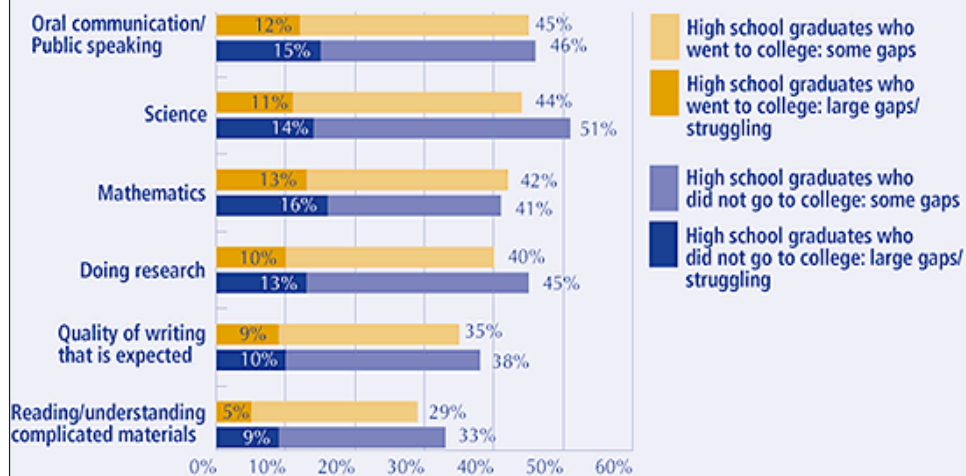
Source: National Center for Education Statistics, Remedial Education at Degree-Granting Postsecondary Institutions in Fall 2000, 2003.

And Those Who Do Often Fail To Earn a Degree

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Many High School Graduates Report Gaps in Their Preparation

In each area, percentage saying there are at least some gaps in their preparation



Source: Peter D. Hart Research Associates, Inc./Public Opinion Strategies, Rising to the Challenge: Are High School Graduates Prepared for College and Work? Prepared for Achieve, Inc., 2005.

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