

Reforming K-12 Mathematics Education

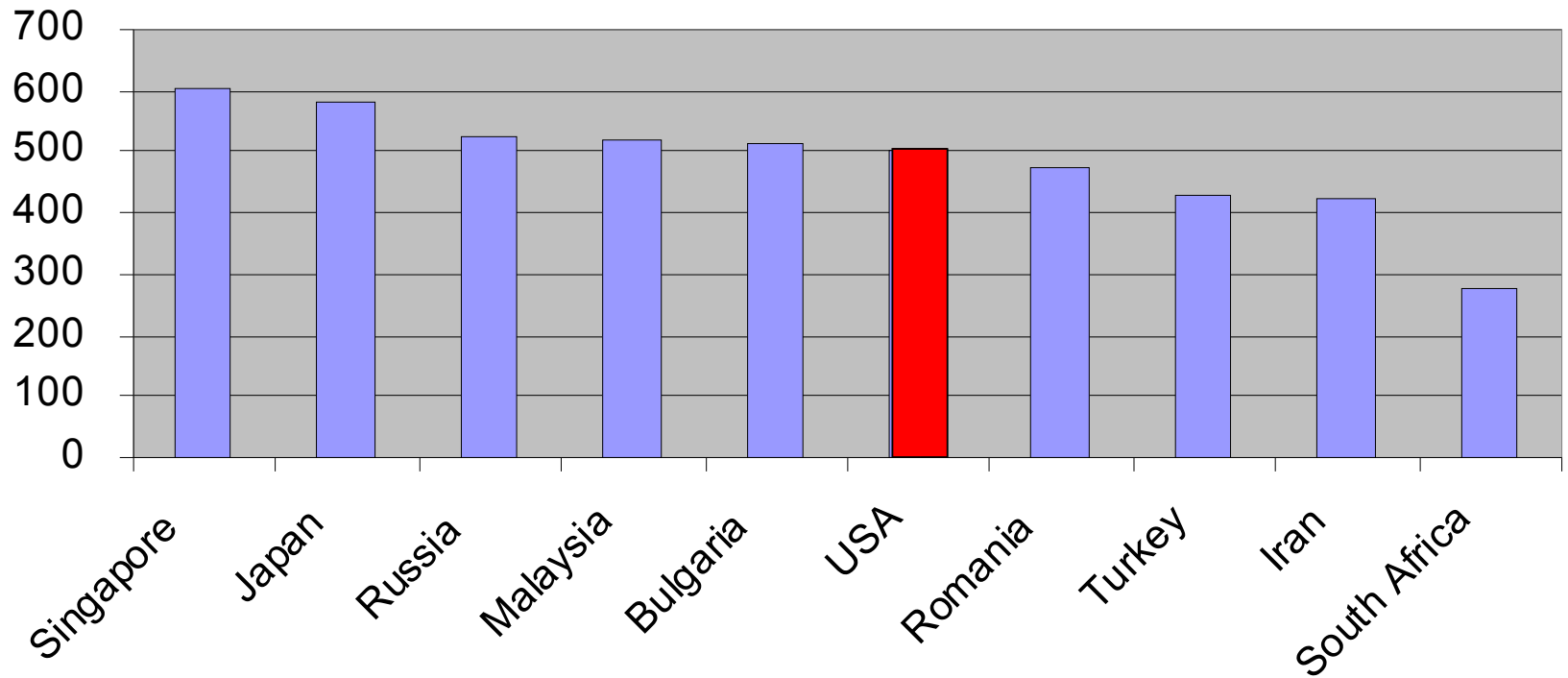
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(opinions are mine, not USAFA's)

What's the problem?

8th grade math scores, IAEEA 2000 Report

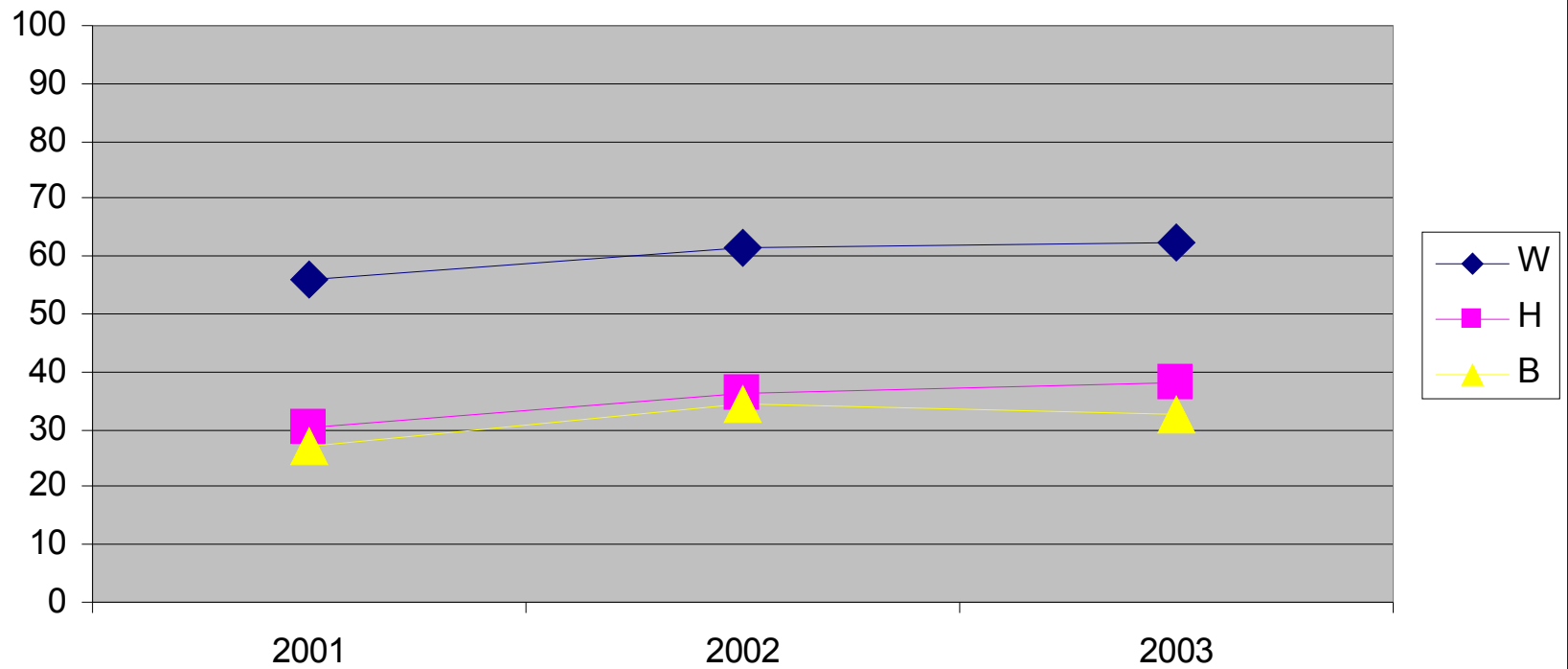


1. Singapore
2. Korea
3. China
4. Hong Kong
5. Japan
6. Belgium
7. Netherlands
8. Slovak Rep.
9. Hungary
10. Canada
11. Slovenia
12. Russia

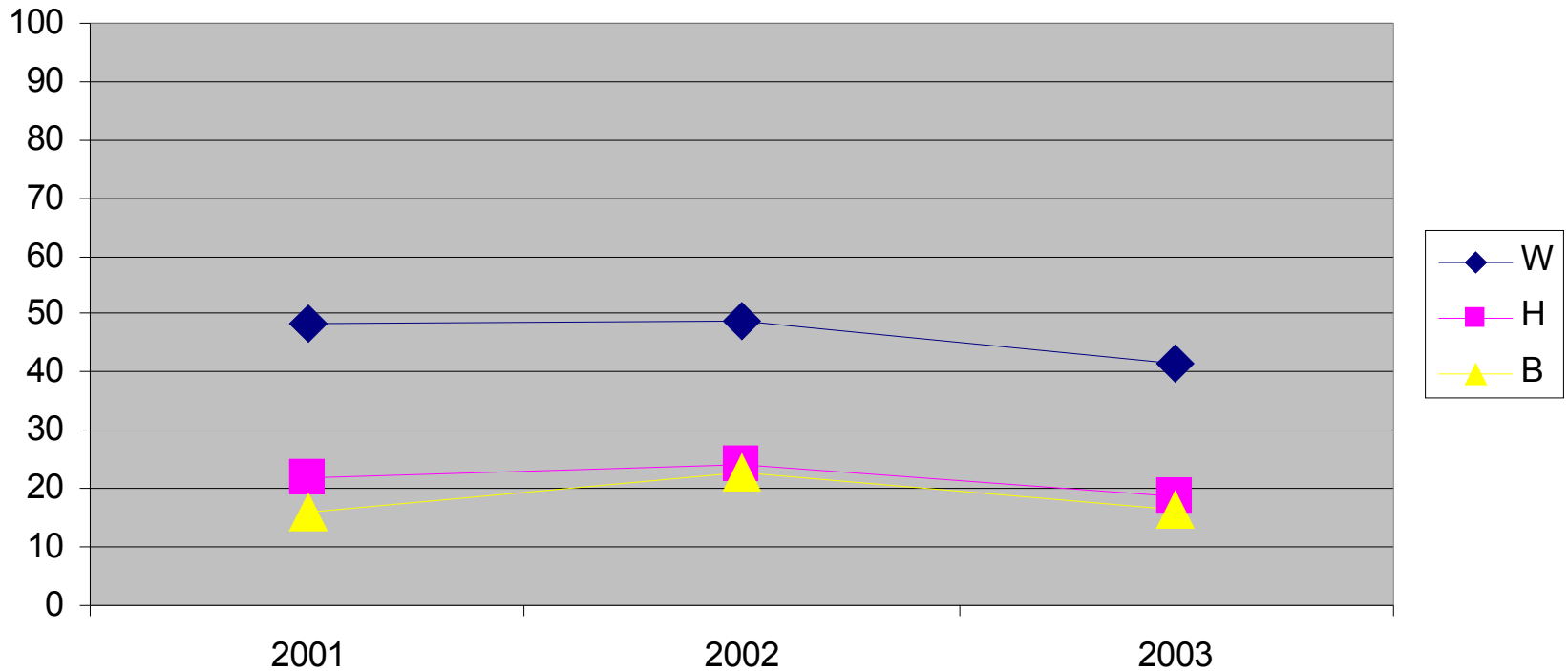
13. Australia
2. Czechoslovakia
3. Finland
4. Malaysia
5. Bulgaria
6. USA
7. England
8. New Zealand
9. Lithuania
10. Italy
11. Cyprus
12. Romania

1. Moldova
2. Thailand
3. Israel
4. Tunisia
5. Macedonia
6. Turkey
7. Jordan
8. Iran
9. Indonesia
10. Chile
11. Philippines
12. Morocco
13. South Africa

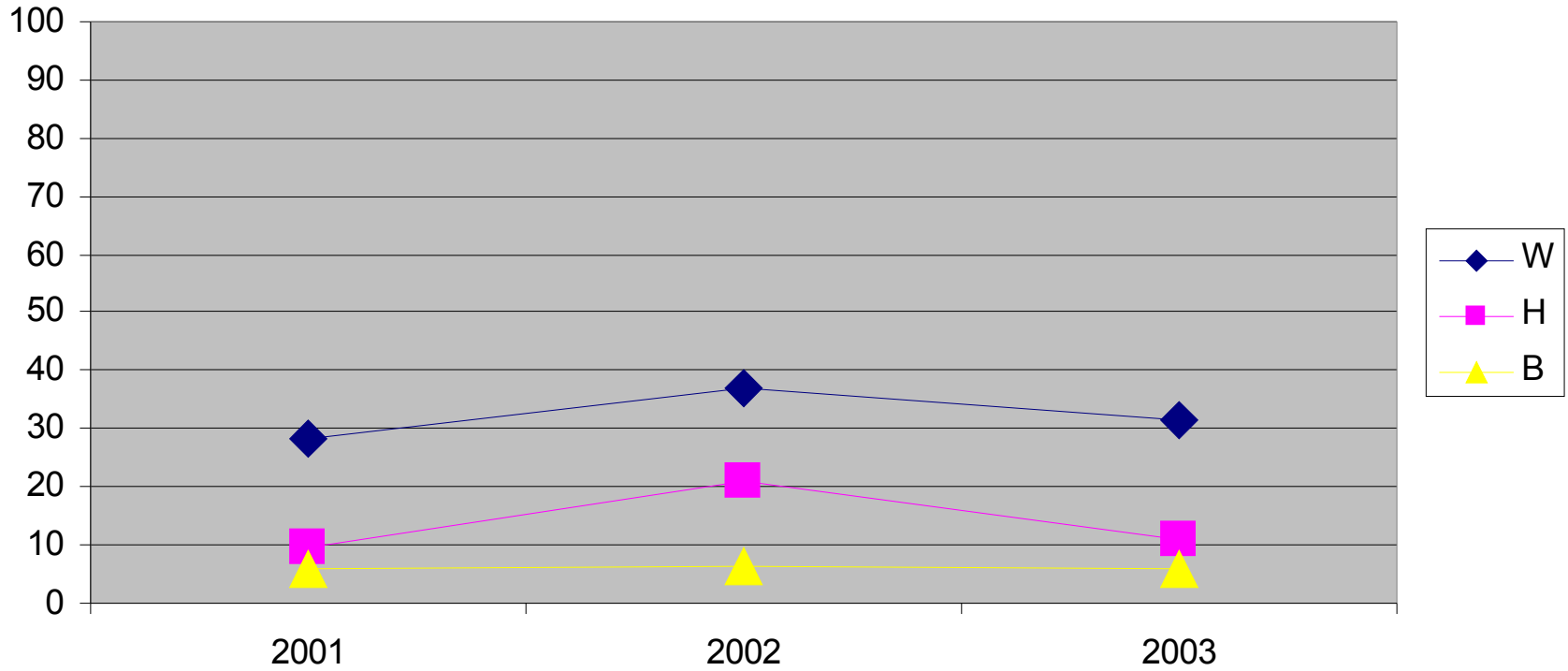
% CSAP Advanced or Proficient (5th grade)



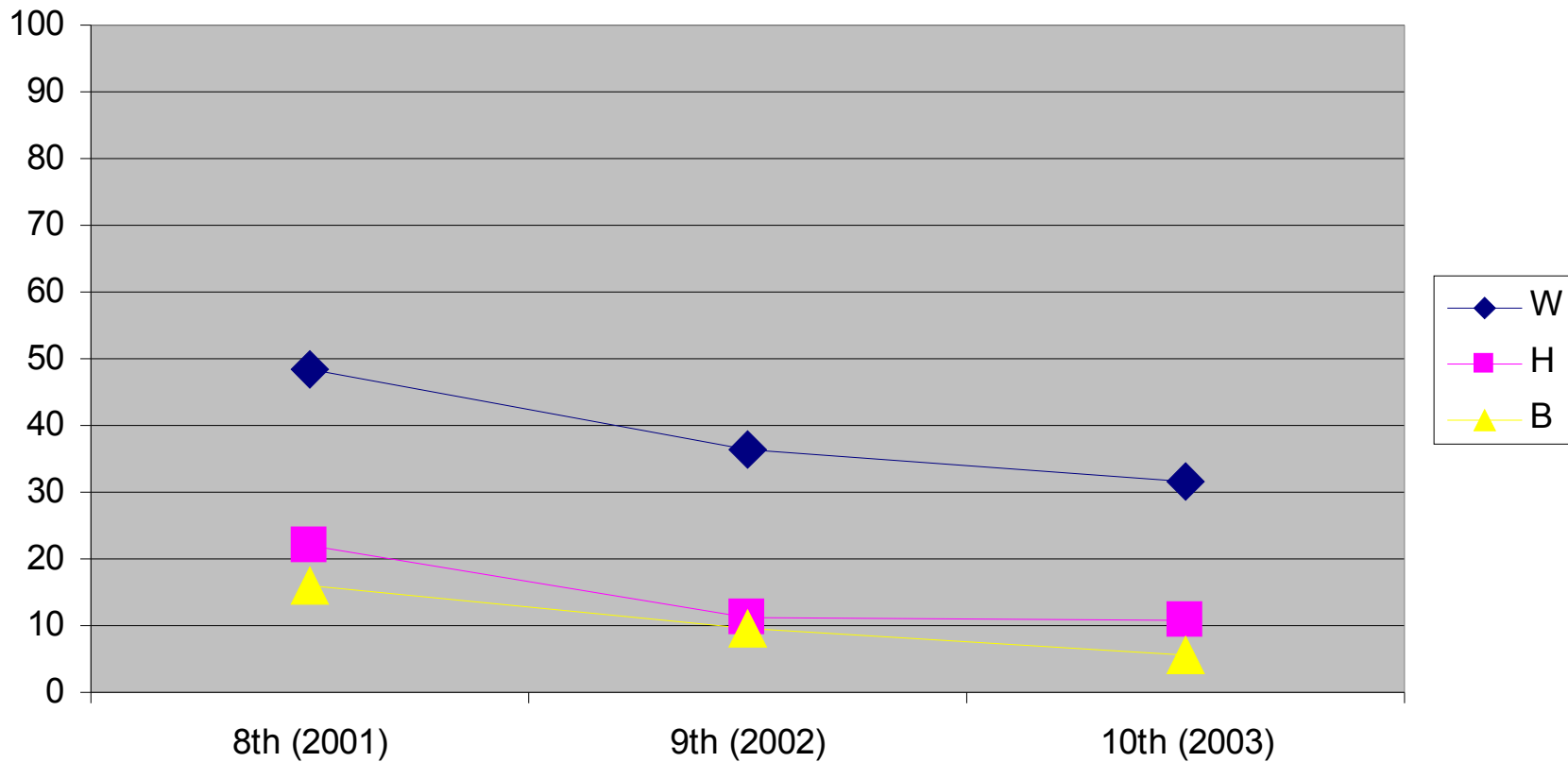
% CSAP Advanced or Proficient (8th grade)



% CSAP Advanced or Proficient (10th grade)



Class of 2005

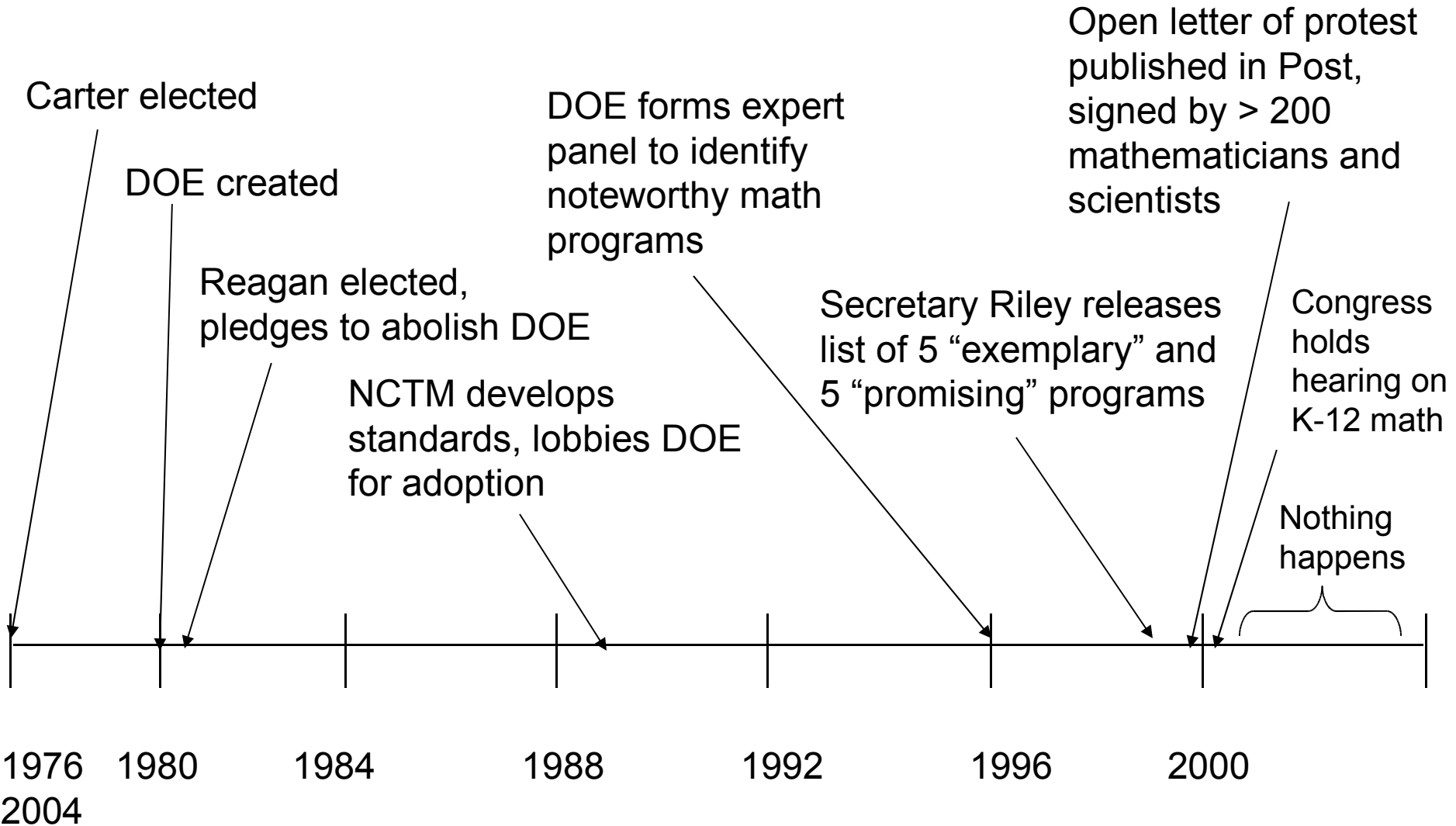


What's the cause?

Widespread adoption of curricula that:

- Emphasize process over content
- De-emphasize math facts
- Embrace constructivism
- Encourage calculator use in early grades
- Encourage group work

How did this happen?



How can we fix the problem?

Characteristics of a good program:

- Emphasis on math facts and algorithms
- Grade-based standards – no spiraling!
- Recognition of foundational nature of math
- Drill, practice, assessment, reinforcement
- No calculators K-5, minimal in 6-8
- Keep the good stuff from NCTM: real-world applications, fun activities, *some* *carefully structured* group work

DOE programs in D-11

“Exemplary” Programs	Elementary	Middle	High
Cognitive Tutor Algebra			
College Preparatory Mathematics			
Connected Mathematics Program		8 (10)	
Core-Plus Mathematics Project			
Interactive Mathematics Program			1 (5)
“Promising” Programs			
Everyday Mathematics	13 (39)		
MathLand			
MMAP			
Number Power			
UCSMP	2 (39)		1 (5)

How do these and other programs measure up?

[disclaimer: not speaking on behalf of USAFA]

Unacceptable:

- IMP
- Mathland
- CMP
- Investigations
- CorePlus

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Barely adequate (but not good enough):

- Everyday Mathematics
- UCSMP
- Math Advantage

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Good to excellent:

- **Glencoe Mathematics/McGraw Hill**
- **Saxon Mathematics**
- **Singapore Math**

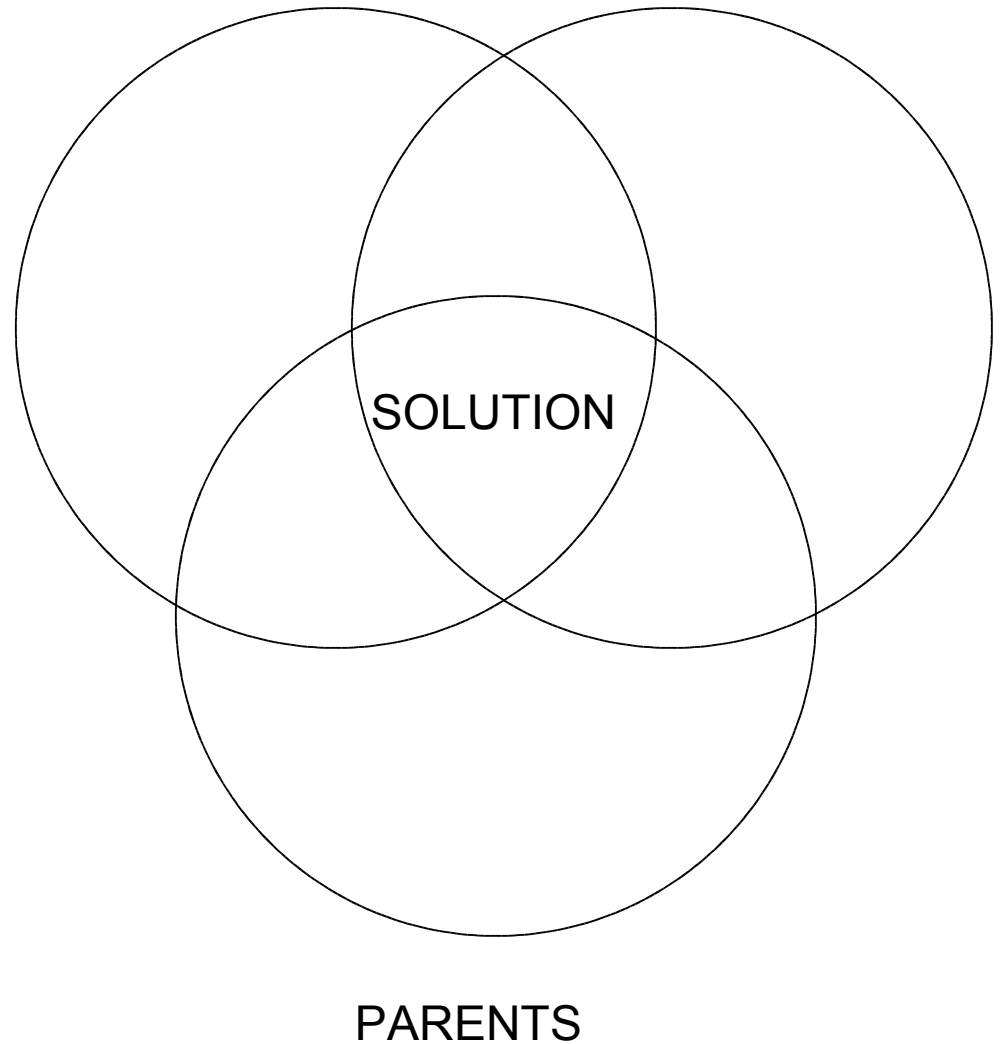
How can we fix things?

- Accept the evidence that the nation's trust in DOE/NSF/NCTM appears to have been misplaced.
- Pursue aggressive adoption of better K-12 math curricula

ADMINISTRATORS

TEACHERS

- No magic bullet: problem must be addressed on multiple fronts



Administrators

- Find and reward teachers with math and science backgrounds, particularly in K-5. Elementary school teachers need to know math way beyond what they teach.
- Resist the temptation to mandate “NSF approved” or “expert recommended” math curricula, particularly if the experts are not mathematicians.
- Hold teachers accountable for the mathematical performance of their students.
- Support teachers who hold students accountable.

Teachers

- Get level-based math standards for your school (see California & Virginia)
- Hold your students (and your peers!) accountable
- Find a math program that emphasizes content, standard arithmetic algorithms, skill and drill, minimal calculator use (none in K-5).
- Supplement as necessary with activities, “real-world” applications, but get the basics right first!

Parents

- If your child's math skills weaker than yours at the same age, investigate why.
- Don't demand that your child be promoted if teacher says that he/she hasn't mastered the material.
- Look at child's math text, ask to see Teacher's Guide and Lesson Plans.
- Remember that your teacher may have no say in curriculum adoption
- Get involved in Mathematics Reform: go online, read NCTM standards, decide for yourself.

Resources

- www.mathematicallycorrect.com
- www.mathematicallysane.com
- www.nctm.org
- www.ed.gov
- www.nychold.com

Conclusion

- Very demanding challenge: must undo over a decade of damage. Lots of work, will take lots of time.
- Eyes of the country are watching
- D-11 can lead the way!