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# Re-Instating Fundamentals into the CCPS Mathematics Curriculum

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**Presentation to the Cecil County Public School  
Board of Education  
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## My Request: Replacements or Alternatives for the Following Textbooks

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Textbook	Recommendation	Level used by CCPS	Comments
Everyday Math	<i>Replace</i>	Elementary Grades	<i>Inadequate</i>
Connected Math	<i>Replace</i>	6 <sup>th</sup> , 7 <sup>th</sup> , 8 <sup>th</sup> Grades	<i>Inadequate</i>
Integrated Math	<i>Alternative</i>	Algebra 1 & 2, Geometry	May have use for non-college bound students*

\* Maryland Graduation Requirement:

“Algebra 1” & “Geometry”

University System of MD, prior to earning credit:

Algebra 1, Geometry and **Algebra 2**

IM is graphing calculator-based; students get final answers from canned programs

University System of MD colleges require that students be able to “show their work”

# 1989 National Council of Teachers of Mathematics Standards

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An extensive set of weak K-12 mathematics standards which *de-emphasized*:

- Memorization of number facts
- “Difficult algorithms” – e.g. long division, place value, carry/borrow
- Algebraic skills
- Geometric proofs

And *encouraged*:

- Use of calculators
- Writing stories: a good story about the wrong answer is better than getting the correct answer
- “Discovery” learning
  - \* Pictures
  - \* Projects
  - \* Group discussions
  - \* Group tests

## **Textbooks Used by CCPS are Aligned with the 1989 NCTM Standards**

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**The National Science Foundation\* (1991) awarded millions of dollars in grants to develop, promote &/or implement textbooks:**

- Consistent with the NCTM standards**
- State Board of Education standards often aligned with the NCTM**

**Including:**

**Everyday Math, Connected Math & *Integrated Math***

**\*Directorate for Education and Human Resources**

## Integrated Mathematics (IM): What is that ?

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- Integrated Math is ***not college preparatory math***
- It is a flawed effort to bring “algebra” and “geometry” to every student
- It has led to a ***redefinition*** of algebra and geometry, and a ***reduction or deletion*** of material critical to these subjects
- Students are not presented with material that helps them develop critical thinking skills.

**IM covers  
too many topics, too quickly, and in no logical order,  
and has led to the charge that US  
curricula are a “Mile Wide, and An Inch Deep”.**

Prof. William Schmidt, Michigan State University in his analysis of the TIMMS study  
[http://en.wikipedia.org/wiki/Integrated\\_mathematics](http://en.wikipedia.org/wiki/Integrated_mathematics)

## **My Request for Math Achievement for All Algebra/Geometry Students**

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**Remove the constraint that there needs to be a single math curriculum and text for all students!**

- Implement a classical math curriculum with more critical thinking content, for anyone planning to attend college
  - Adopt text books that are mathematician-approved (e.g. Dolciani)

**Classical mathematics would not require any greater resources than the current algebra/geometry curriculum**

- CCPS has Dolciani texts – *could be piloted in 07/08 at North East*
  - CCPS has teachers who have taught classical algebra & geometry
- Continue to offer Integrated Math for those students who prefer it**

## CCPS is Piloting a “STEM” Curriculum at EHS and PHS in 07/08

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### Advanced Science, Technology, Engineering and Mathematics Curriculum

- Students entering the STEM program will have *already completed Algebra 1 & Geometry*
- Deficiencies in their algebra and *geometry* skills will not be rectified in the STEM
- These deficiencies will limit their achievement in areas of math, science & engineering, and...
- Impede students from taking “heavy math” subjects, e.g. *physics*

***The most effective thing that CCPS can do to improve science is to re-instate traditional mathematics !***

# What Have Weak Math Programs Done for the U.S. ??

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## The NCTM Claim:

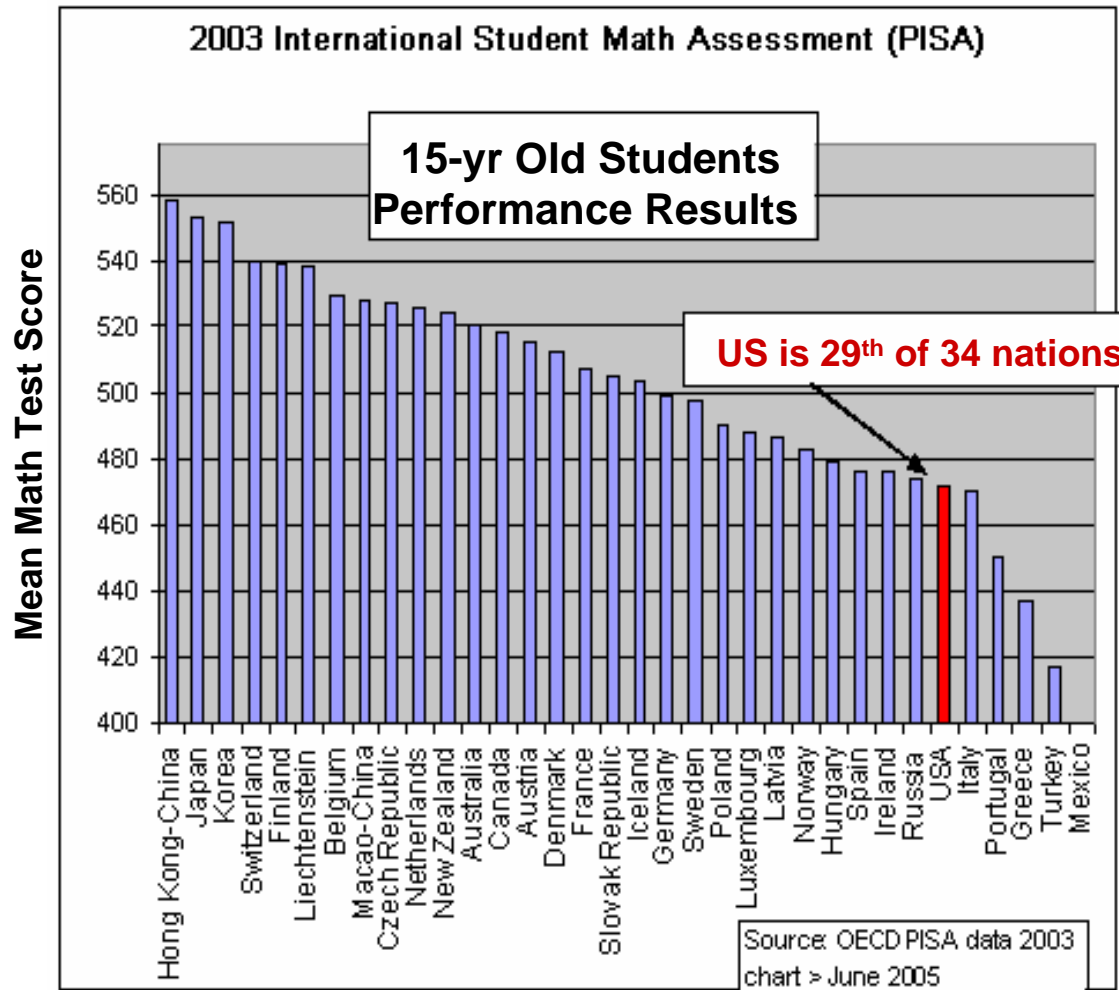
**“these programs are more inclusive & beneficial to students in a high-tech age”**

## The Reality:

**these programs have led to *very poor performance* of U.S. students in International Testing!**

# US Teens Perform Below Average in International Testing

From <http://wmhodes.home.att.net/> (Education Report Chapter)



Organization for Economic  
Cooperation &  
Development report:

The US average  
*was significantly below*  
the normalized  
International Average

## Math Programs Based on NCTM Standards are Not Working !!

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In 2000, a petition was sent to the then-Secretary of Education, Richard Riley, asking him to:

*withdraw support for NCTM-based textbooks, which*

*“fall short of giving students the essential tools to reason accurately.”*

The textbooks cited included:

**Everyday Mathematics, Connected Math and Integrated Math**

*Over 240 Math Professors and Department Chairpersons from the major colleges and universities in the U.S. , including **3 Nobel Laureates**, a **Wolf Prize in Physics winner** and several **Fields Medal recipients** signed this petition !!*

<http://www.mathematicallycorrect.com/riley.htm>

# **Textbook Reviews from “Mathematically Correct”**

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**A National Organization whose key members and advisors, include:**

- Nationally-recognized, award-winning mathematicians & scientists**

**Includes:**

- Teachers, parents, citizens,**

**Who are concerned about weak math curricula**

































**Paul Clopton, Erica McKeown, Michael McKeown, and Jamie Clopton**

**<http://www.wheresthemath.com/mathematiciansspeak.html>**

## 5<sup>th</sup> Grade Text Book Review

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### CCPS uses Everyday Mathematics

Program	Math Depth	Present-ation	Student Work	Overall Eval.
<b>SRA</b>				
<b>Saxon</b>				
<b>Silver Burdett Ginn</b>				
<b>Scott Foresman/AW</b>				
<b>Harcourt Brace</b>				
<b>McGraw Hill</b>				
<b>Everyday Mathematics</b>				
<b>Dale Seymour</b>				

**Everyday Mathematics: Not recommended for use.**

- Rated next-to-lowest among the fifth grade programs reviewed.
- Everyday Mathematics surveys some rather sophisticated areas of mathematics, without support for the development of topics or student mastery of content.

# Everyday Math

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Wasn't necessarily *practiced* as soon as the textbooks appeared

- My sons had “Everyday” books, but ...
  - Their math curriculum was highly supplemented, and except for a 5<sup>th</sup> grade “heterogeneous” class after NCLB (a disaster), my sons had excellent elementary school math – **But their curriculum was not REALLY EVERYDAY MATH !!**
- Current curriculum “alignment” impedes supplemental work

## 7<sup>th</sup> Grade Math Book Reviews

### CCPS text: Connected Math

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Program	Property	Expon	Fract	Decimal	Percent	Proport
<b>Glencoe ** Pre-algebra</b>	████████	████████	████████	████████	████████	████████
<b>McD/L ** Alg/Geo</b>	██████	██████	████████	████████	████████	████████
<b>Saxon ** Alg 1/2</b>	██████	████████	████████	████████	████████	████████
<b>Scott Foresman/AW</b>	██████	██████	██████	██████	████████	████████
<b>Glencoe</b>	████	██	████████	██████	████████	██████
<b>Harcourt Brace</b>	██████	████	██████	██████	████████	████████
<b>Prentice Hall</b>	██████	██████	████	██████	████████	████████
<b>Saxon Math 87</b>	██████	████	██████	██████	██████	██████
<b>McD/L Passport</b>	██████	████	██████	████	██████	████████
<b>McD/L Math Thematics</b>	████	████	████	████	██████	████
<b>Connected Math</b>						████████

**Connected Math: *Not suitable***

***Students leaving this course will have no pre-algebra skills.***

# Algebra 1 Text Book Review

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Text	Grade	Score
AW	F	
Cord	D+	
Focus	D+	
Foerster	A	
Collins, et. al (MCPS uses)	B	
Larson, et. al (HCPS uses)	B	
HRW	C	
Brown, et. al	D	
Prentice	C	
Dolciani, et.al	A	
SW	C	
UCSMP (Integrated Math)	C	

Integrated Math: ***Not Recommended for Use***

CCPS uses McDougal-Littell Integrated Math (not listed);

in a separate review was rated extremely poorly

<http://www.mathematicallycorrect.com/integrat.htm>

# Maryland Student Outcome and Achievement Report

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SOAR, (Oct. 2006; data for 2004/2005):

- Generated Biannually by the Maryland Higher Education Commission
- Provides statistics for **Number of Students Entering College:**
  - \* *Maryland Public High School Graduates*
  - \* *Entering any state-aided Maryland College/University*
  - \* *Fall Semester of the Year they Graduate from HS*
- Includes statistics on **Students requiring College “Remedial” Math Courses**
  - \* Algebra 2, or lower, is a remedial course (University System of MD)
  - \* Core and Non-Core Students
    - (Core completed 3yrs HS Math/Soc Sci, 4yrs Eng, 2yrs Nat Sci/2 For Lang)

***Remedial courses incur full tuition, but do not earn credit towards a degree***

## MD Public High School Students Enrolled in a MD College\*

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County	Enrolled in a MD College
	% HS Grads
<b>Cecil</b>	<b>34.6</b>
<b>Prince George's</b>	<b>39.3</b>
<b>Baltimore City</b>	<b>39.7</b>
<b>Frederick</b>	<b>44.5</b>
<b>Harford</b>	<b>51.7</b>
<b>Howard</b>	<b>53.1</b>
<b>Maryland Average</b>	<b>46.2</b>

**Cecil County is significantly below the MD average  
Only Kent County had a lower % of students enrolled (33.1/22.9)**

## Percent of HS Grads Needing Math Remediation in College

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County	2004-2005	
	Core	Non-Core
Prince George's	44	54
Baltimore City	37	60
<b>Cecil</b>	<b>43</b>	<b>44</b>
<b>Harford</b>	<b>40</b>	<b>49</b>
Baltimore County	18	20
Frederick	26	38
Montgomery	30	41
<b>Maryland Average</b>	<b>30</b>	<b>41</b>

PG, Baltimore City, **Cecil & Harford** Jurisdictions Require the Most Remediation  
***Cecil and Harford*** Counties ***Should be Doing Better!***

## What do HCPS and CCPS Have in Common ??

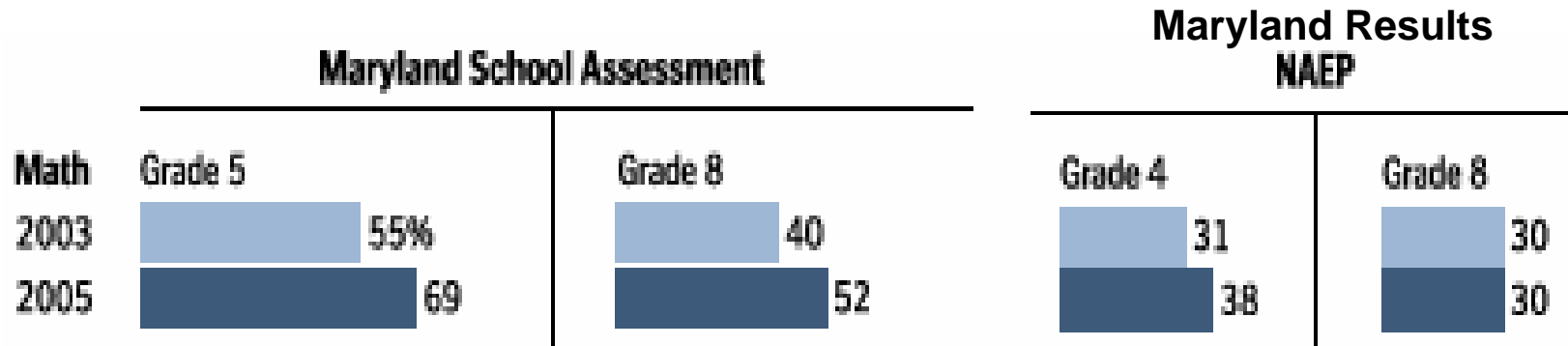
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Both use **Everyday Math** and **Integrated Math**

*These programs have not prepared  
HCPS or CCPS students  
for college.*

## Percentage of Students Proficient or Advanced in Math

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*Maryland School Assessment test performance suggests impressive gains.*

*In reality, as indicated by the National Assessment of Educational Progress test:*

- *There is no significant change in Maryland School math performance*
- *Proficiency rates are much lower in the NAEP test than the MSA suggests*

***MSA score increases are not  
credible indicators of improved math education***

## 2005 SAT Math Scores

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	Avg. Math Score	% Taking SAT
Cecil County	519*	43
Maryland	515**	71
Tome*	~ 600	100

\* The administration's conclusion was that Cecil County students out-performed the average Maryland student. This was based on the average SAT math score.

The reality is that statewide, **71% of Maryland students achieved a score (515) quite comparable to the 519 score that was only achieved by 43 % of Cecil County students!**

\* The Tome School uses classical mathematics textbooks

\* 10/10/2005 CCPS Board of Education formal meeting board minutes

\*\* [www.marylandpublicschools.org/NR/exeres/4A311177](http://www.marylandpublicschools.org/NR/exeres/4A311177)

# What are the Better-Performing Schools in MD doing in Math ??

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They are not doing **Everyday Math, Connected Math** or **Integrated Math**

**Baltimore County**

**Carroll**

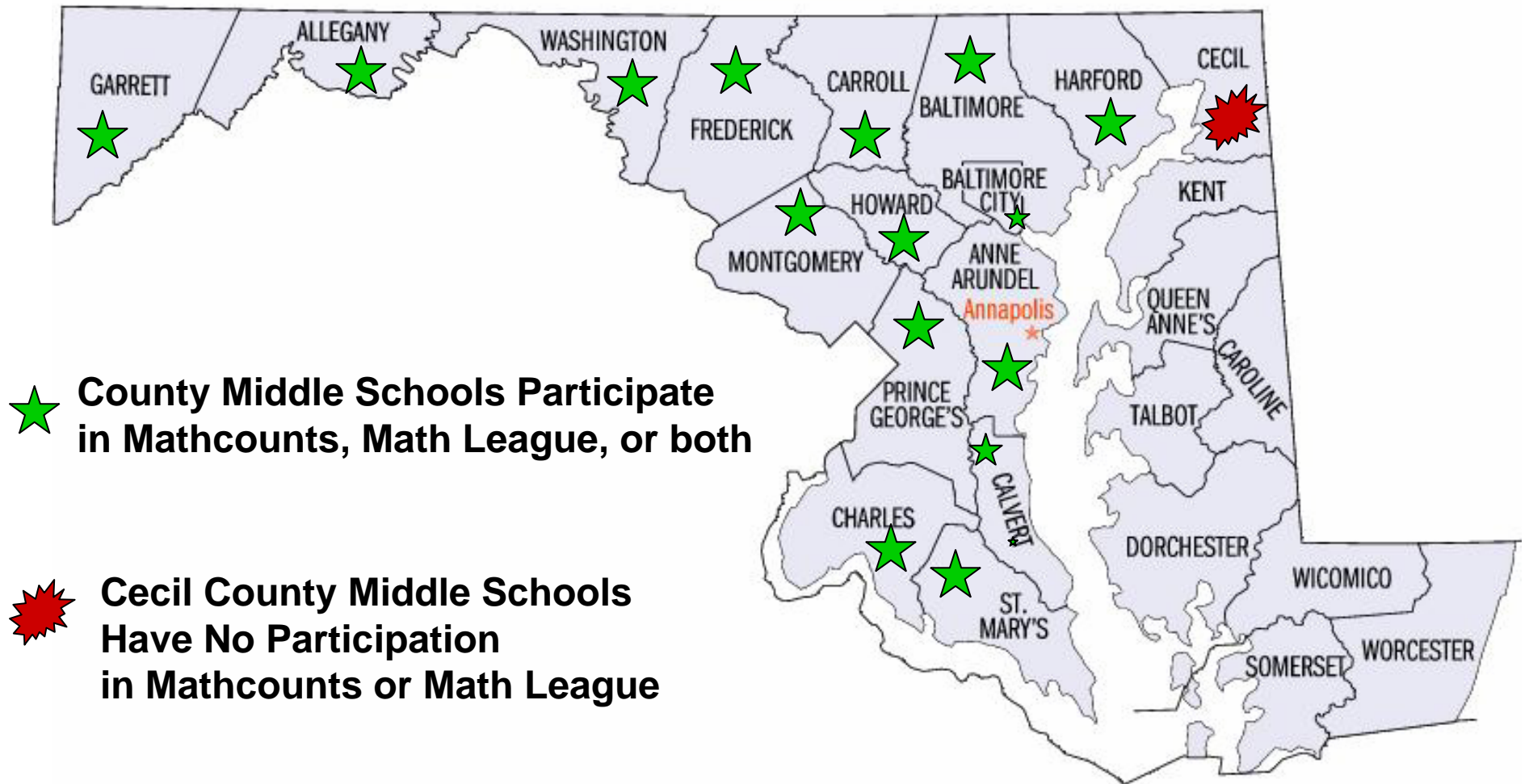
**Frederick**

**Howard**

**Montgomery**

# MD Public School Participation in National Math Clubs and Competitions

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Montgomery & Frederick Counties consistently achieve National Mathcounts honors  
These counties do not use Everyday, Connected and Integrated Math Programs

## **CCPS Would Benefit Greatly from a Math and Science Advisory Panel**

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- **Weak math programs would not have been implemented if a Math & Science Advisory Panel were in place**
- **CCPS Administration over-seeing math & science curricula do not hold formal BS degrees in math, or in a field that requires coursework with math majors**
- **Teacher and parent input would be welcomed**
- **Help research the implications of any major changes to curriculum, textbooks etc.,**
- **Many very successful school systems (by national indicators) have a permanent MSAP**

# Summary of Request

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**CCPS reestablish a classical mathematics curricula:**

**Replace Everyday Math and Connected Math**

**Provide an Alternative to Integrated Math**

**This needs to happen immediately to rectify the current deficiencies:**

- Cecil and Harford Counties stand out as not adequately preparing students for college, apparently due to curriculum rather than social-economic reasons.
- At all levels, the math textbooks used in the CCPS have received poor reviews by national education groups and proclaimed inadequate.
- While MSA scores have risen through out the state including Cecil County, national indicators are that students do not have improved math skills.
- CCPS has a low level of students taking math-based curricula such as physics.

## Concluding Remarks

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**How do I personally deal with gaps in the math curriculum?**

**My boys work regularly from classical math textbooks I have purchased**

**I am fortunate to be able to provide a complete math education for my sons**

***I am asking that every student be given this opportunity***

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## **Back-up Viewgraphs**

## Specifically, What is Lacking in Integrated Math ??

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- ***Pre-algebra exercises*** to make students comfortable manipulating variables
  - ***Word problems*** that require the student to formulate equations, & which become *gradually* more difficult, so that students gain confidence
  - ***Simplifying, factoring, rearranging*** needed to solve problems
  - ***Graphing with paper, pencil, straight-edge*** requiring scaling, determining large intercept
  - ***Geometrical proofs?*** (a basis for logic development- important also for law, forensics, political science and writing ...)
- “A public school student has never passed our geometry proficiency exam”***  
*Dr. Williams, The Tome School*
- In Algebra 2, more ***advanced functions*** are explored almost entirely with calculators, so basis for *pre-calc and calculus is weak*

## Specifically, What is Lacking in Integrated Math ??

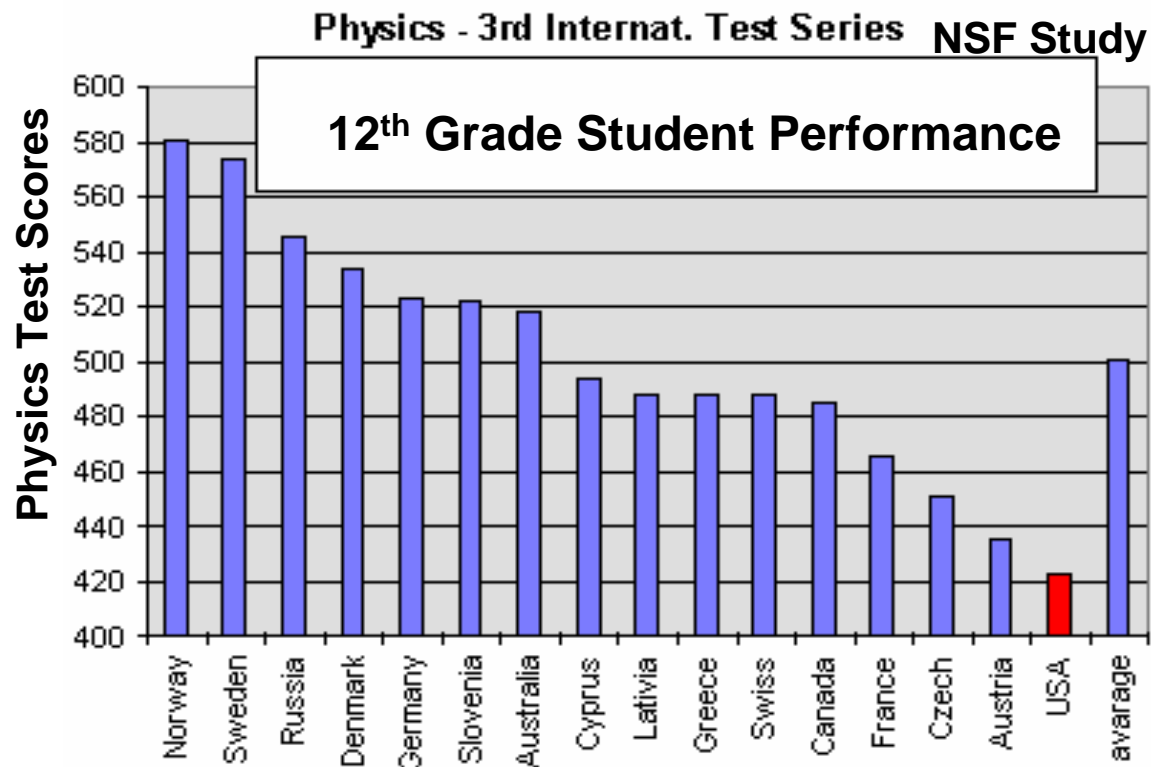
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- ***Pre-algebra exercises*** to make students comfortable manipulating variables
- ***Word problems*** that require the student to formulate equations, & which become *gradually* more difficult, so that students gain confidence
- Simplifying, factoring, rearranging needed to solve problems
- Graphing problems requiring scaling, determining large intercept values, done with paper, pencil and a straight-edge ?
- In geometry: *where are the proofs? (a basis for logic development-important also for law, forensics, political science and writing ...)*
- In Algebra 2, functions are explored almost entirely with calculators, so basis for *pre-calc and calculus is weak*

**Algebra is the Common Language of, and Gateway to, All of Higher Math  
Geometry is the Basis for Logic Development**

**“ Barry Garelick”, Hoover Institution**

# Trends in International Mathematics and Science Study (TIMMS)



**“American Kids Don’t Do Science Anymore”**  
**One Cannot do Physics, ( & other Sciences), Without Math**

**Number of Students enrolled in S&E Programs:**

- US ranks **17<sup>th</sup>** of countries surveyed
- In **1975**, the US ranked **3<sup>rd</sup>**

NSB statistic, reported in:  
[http://www.eurekaalert.org/pub\\_releases/2004-05/nsf-uss043004.php](http://www.eurekaalert.org/pub_releases/2004-05/nsf-uss043004.php)

# Connected Math

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*“It is impossible to recommend a book with as little mathematical content as this and, with such an inefficient instructional method”*

Properties, Order of operations

Exponents, Squares, Roots, Scientific Notation

Fractions, Decimals Percents, Proportions

Shapes, Objects, Angles, Similarity, Congruence

Area, Volume, Perimeter, Distance

Expressions and Equations – Writing, Simplifying and Solving

These topics were: “Missing, Cryptic, Very Weak, Insufficiently Covered, Emphasized Heavy Use of Calculators”

Graphing: The one advantage of the heavy emphasis that this book places on graphical over analytic solutions is that graphing is covered moderately well.

*Students leaving this course will have no pre-algebra skills.*

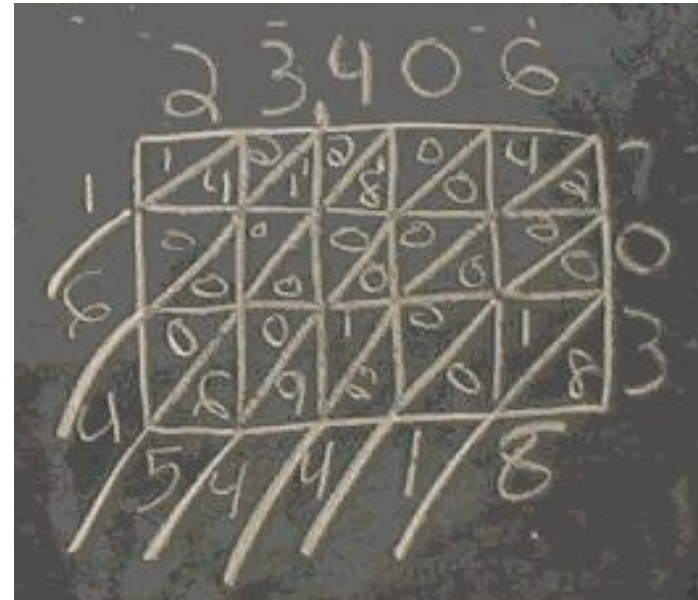
# Everyday Mathematics

## Add-Up Algorithm

$$\begin{array}{r} 932 \\ -356 \\ \hline \end{array}$$
  
$$\begin{array}{r} 356 + 4 \\ 360 \leftarrow + 40 \\ 400 \leftarrow + 500 \\ 900 \leftarrow + 32 \\ 932 \leftarrow \\ \hline 576 \end{array}$$

Addition: Adding-up Algorithm

**4 Addition Algorithms**  
**5 Subtraction Algorithms**



Multiplication: Lattice style

**4 Multiplication Algorithms**  
**2 Division Algorithms**

Rapid Spiraling:

'It doesn't matter if students don't get it the first time around'



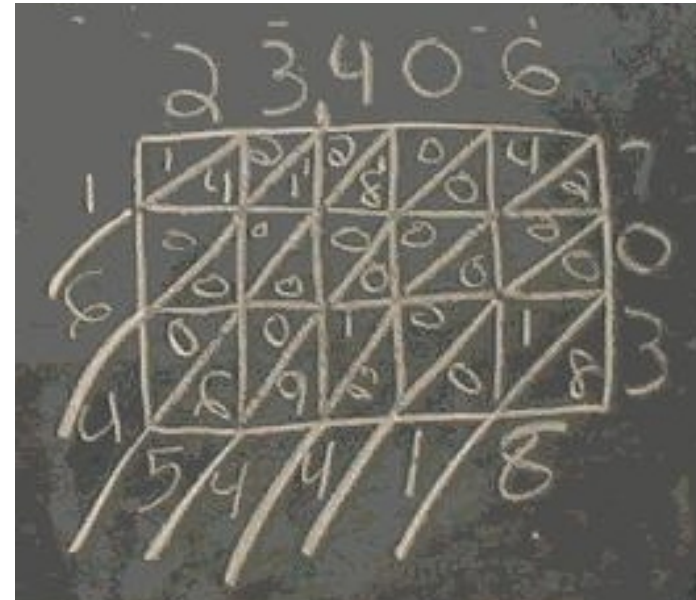
# In a Global Economy, Math is a Universal Language\* but ...

## Add-Up Algorithm

$$\begin{array}{r} 932 \\ -356 \\ \hline \end{array}$$

$$\begin{array}{r} 356 + 4 \\ 360 \leftarrow + 40 \\ 400 \leftarrow + 500 \\ 900 \leftarrow + 32 \\ 932 \leftarrow \\ \hline 576 \end{array}$$

Addition: Adding-up Algorithm



Multiplication: Lattice style

... **Everyday Mathematics does not translate !!!**

\* Leslie Haynes, engineer, ATK Thiokol

# Everyday Mathematics: Does your child's math look like this?

## Addition

$$\begin{array}{r|l|l}
 & 1 & 4 & 8 \\
 + & & 6 & 7 \\
 + & 2 & 6 & 6 \\
 \hline
 & 3 & 16 & 21 \\
 \rightarrow & 3 & 18 & 1 \\
 \rightarrow & 4 & 8 & 1 \\
 \rightarrow & 48 & 1 & 
 \end{array}$$

## Subtraction

$  \begin{array}{r l l}  2 & 11 & \\  & 1 & 15 \\  - & 2 & 5 \\  \hline  & 5 & 8 \\  - & 2 & \\  \hline  & 6 & 7  \end{array}  $	$  \begin{array}{r}  58 \\  + 2 \\  \hline  60 \\  + 40 \\  \hline  100 \\  + 200 \\  \hline  300 \\  + 25 \\  \hline  325  \end{array}  $	<p>and then</p> $  \begin{array}{r}  \\  + 2 \\  + 40 \\  + 200 \\  + 25 \\  \hline  267  \end{array}  $
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## Multiplication

$$\begin{array}{r}
 83 * 27 \\
 + 1 \quad 27 \\
 + 2 \quad 54 \\
 + 4 \quad 108 \\
 + 8 \quad 216 \\
 + 16 \quad 432 \\
 + 32 \quad 864 \\
 + 64 \quad 1728 \\
 \hline
 83 \quad 2241
 \end{array}$$

	8	3	
	+-----+	+-----+	
1	1 /   0 /		2
	/ 6 /   6 /		
	+-----+	+-----+	
11	5 /   2 /		7
	/ 6 /   1 /		
	+-----+	+-----+	
	14	1	
	1, 11, 14, 1		
	-> 1, 12, 4, 1		
	-> 2, 2, 4, 1		
	= 2241		

## Division

$  \begin{array}{r}  16 \overline{) 1220} \\  \underline{- 800} \\  420 \\  \underline{- 320} \\  100 \\  \underline{- 80} \\  20 \\  \underline{- 16} \\  4  \end{array}  $	$  \begin{array}{r}  50 \\  20 \\  5 \\  1 \\  \hline  76  \end{array}  $
ans: 76 R4	