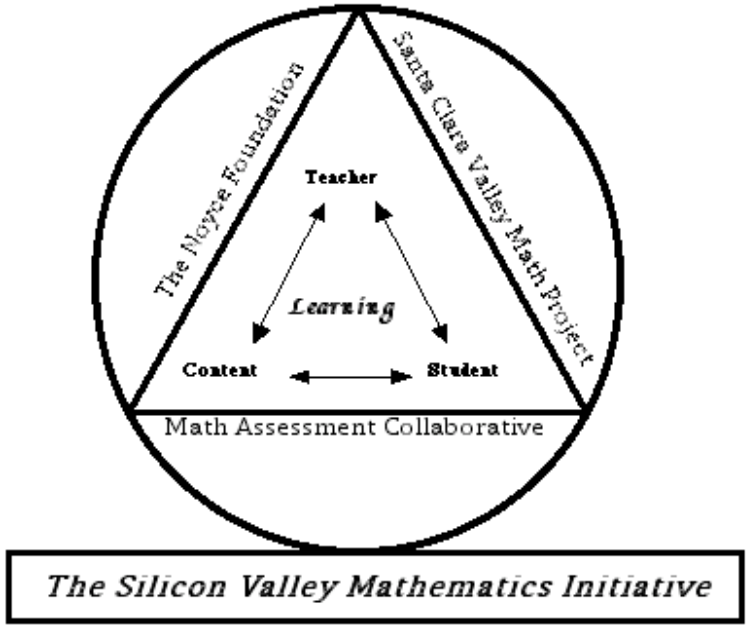
The Mathematics Assessment Collaborative

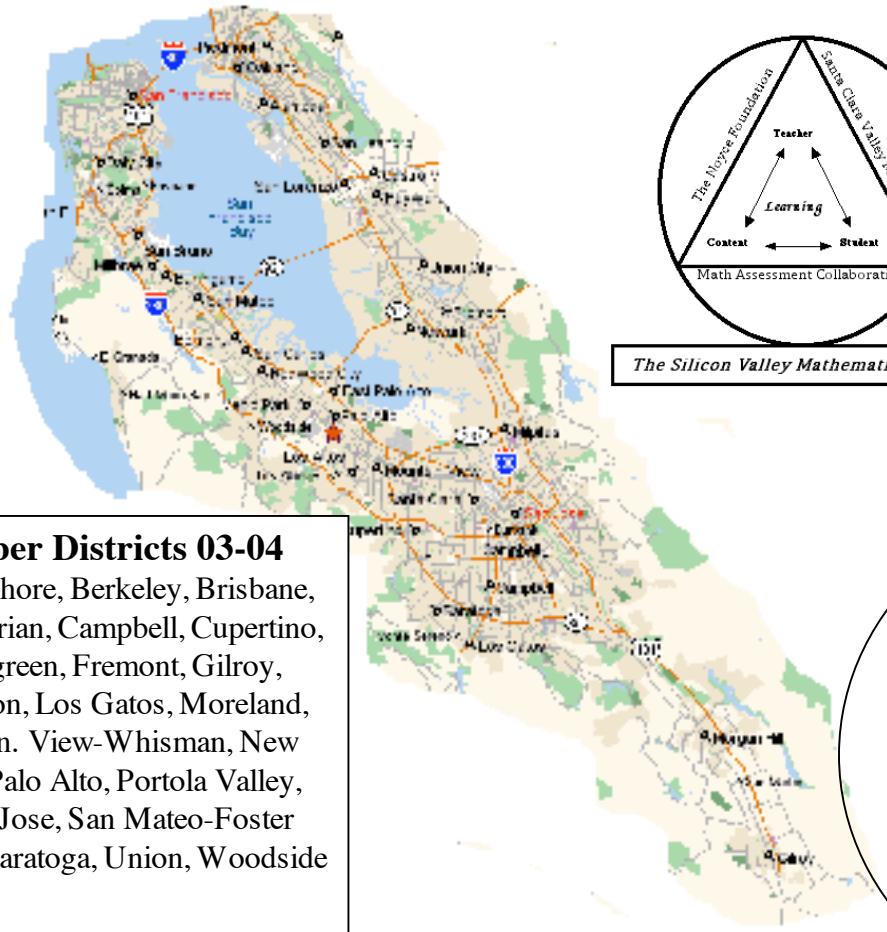


Preliminary Results of the 2004 MARS Performance Exam

“The Bible tells us to study math.”

It says, “ Go forth and multiply.”

The Silicon Valley Mathematics Initiative has grown from 29 to 34 member districts representing three counties of the Bay Area.



The Silicon Valley Mathematics Initiative

SVMI Member Districts 03-04

Alum Rock, Bayshore, Berkeley, Brisbane, Burlingame, Cambrian, Campbell, Cupertino, East Side, Evergreen, Fremont, Gilroy, Hayward, Jefferson, Los Gatos, Moreland, Morgan Hill, Mtn. View-Whisman, New Haven, Pacifica, Palo Alto, Portola Valley, San Carlos, San Jose, San Mateo-Foster City, Santa Clara, Saratoga, Union, Woodside

New Districts

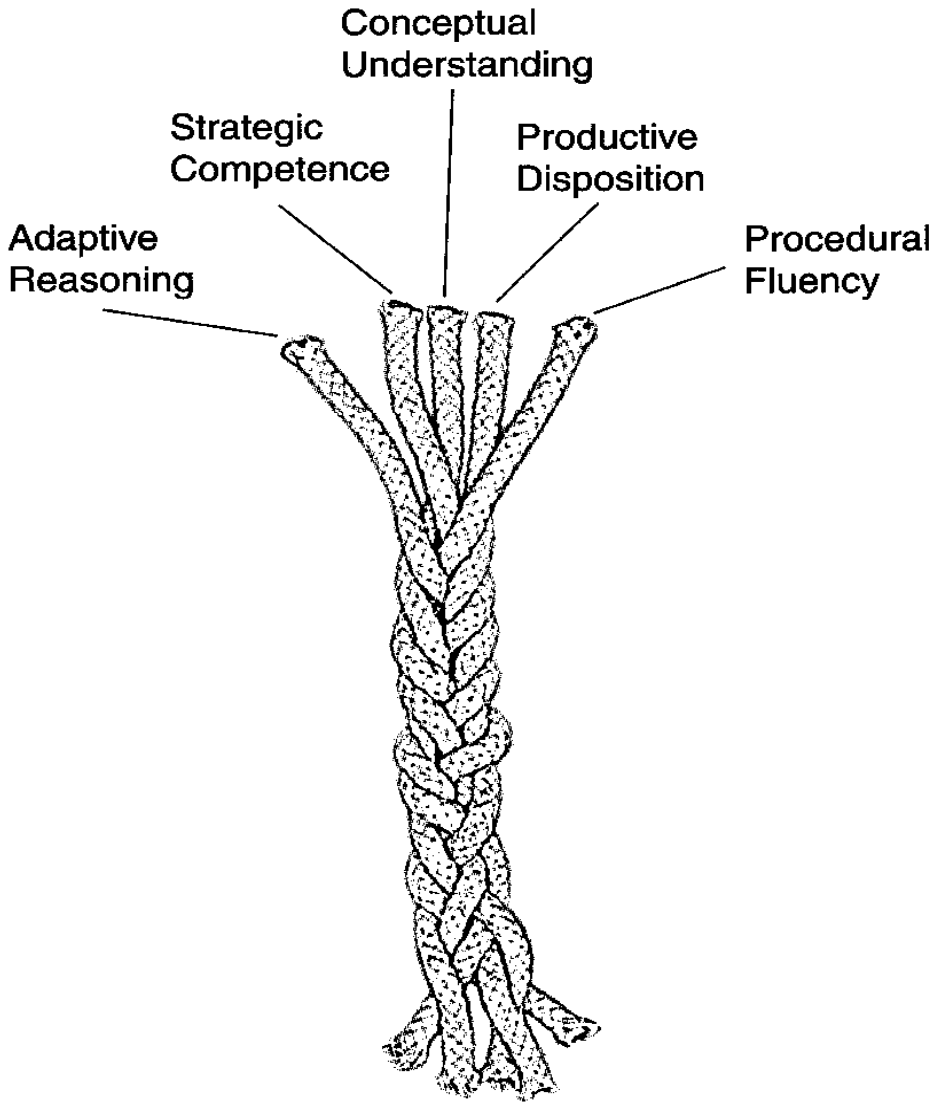
- Aspire Charter Schools
- Emery SD
- Oakland USD
- San Mateo Court Schools,
- Ravenswood SD

Mathematics Assessment Collaborative

The most significant growth has been in the number of students assessed even though the number of districts has remain relatively constant.

Years of Exam	Districts	Teachers	Students
1999	21	462	23,128
2000	27	701	35,061
2001	26	1,036	51,806
2002	26	1,088	54,409
2003	28	1,440	72,016
2004	28	1,622	81,075

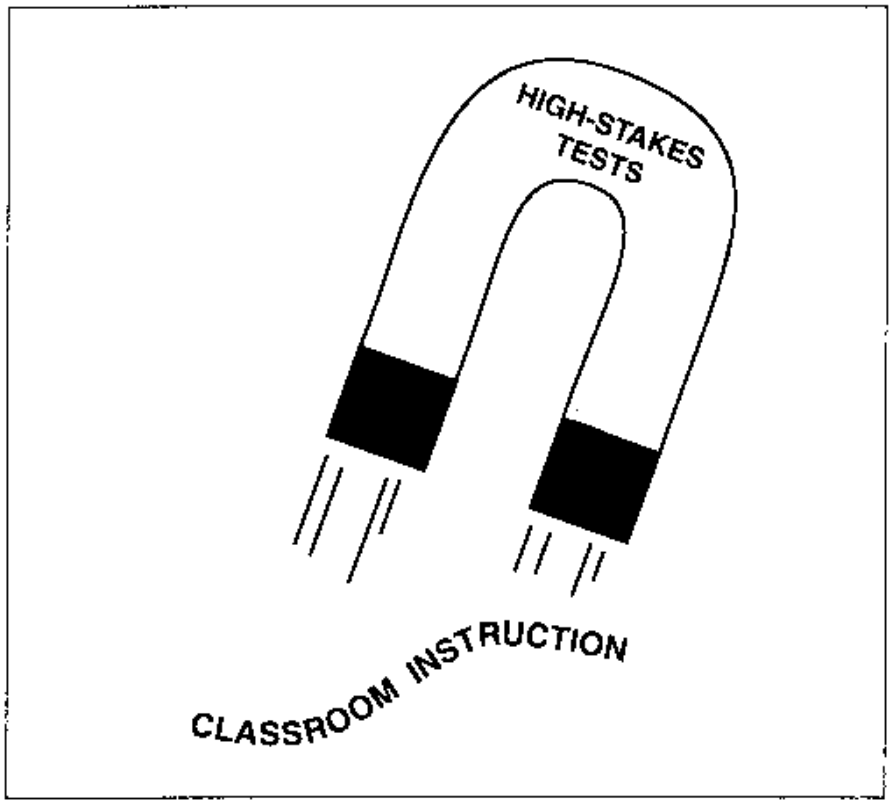
Intertwined Strands of Proficiency



Adding It Up: Helping Children Learn Mathematics, **NRC**, 2001

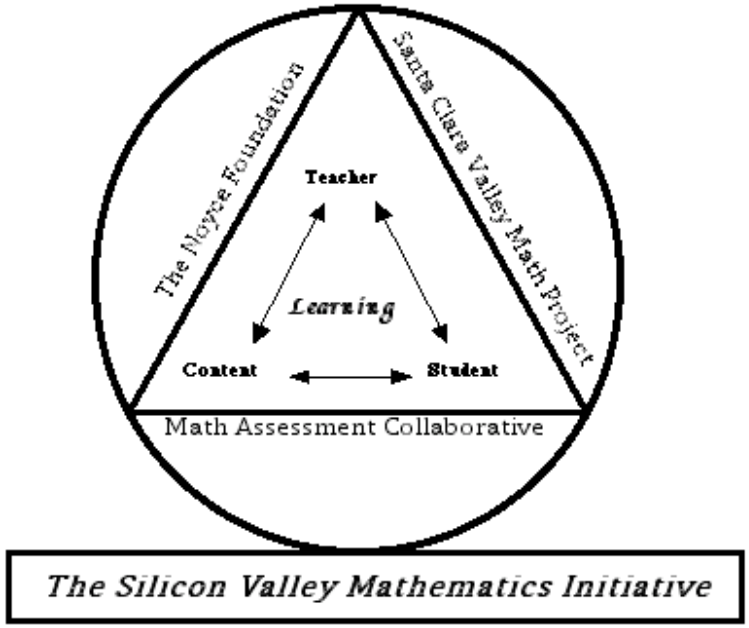
Teaching for Meaning

The Need for Multiple Measures



- To provide a robust and comprehensive evaluation of student achievement.
- To provide windows into student knowledge and understanding in order to inform instruction.
- To provide in depth assessments that measure complexity of reasoning and performance.
- To provide a balance perspective on what is of value to teach.

The Mathematics Assessment Collaborative



Linda Fisher, Director

- Member Districts (28 in 2003)
- SCVMP (state subject matter project) at San Jose State is Fiscal Agent
- Support by the Robert Noyce Foundation
- Contracts with CTB-McGraw Hill for Balanced Assessment/MARS Exam.
- Translation provided by Second Language Testing Incorporated, D. C.
- Data Analysis provided by Educational Data Systems

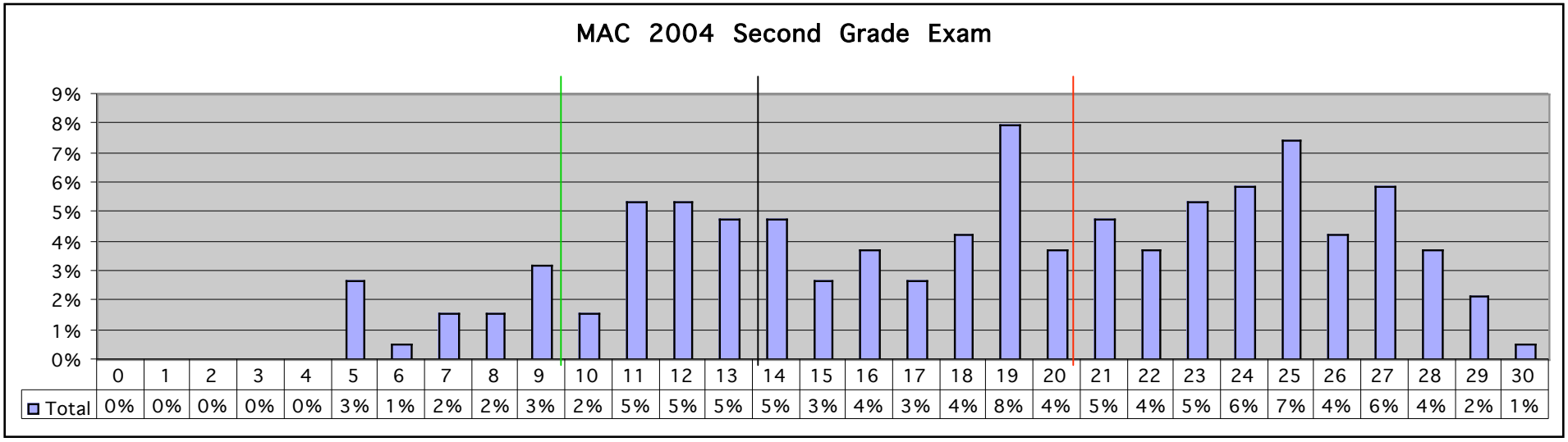
Performance Level Cuts Score and Distribution Data

- The data is based on a random 5% sample of student papers collected by the member districts and forwarded to the MAC Director.

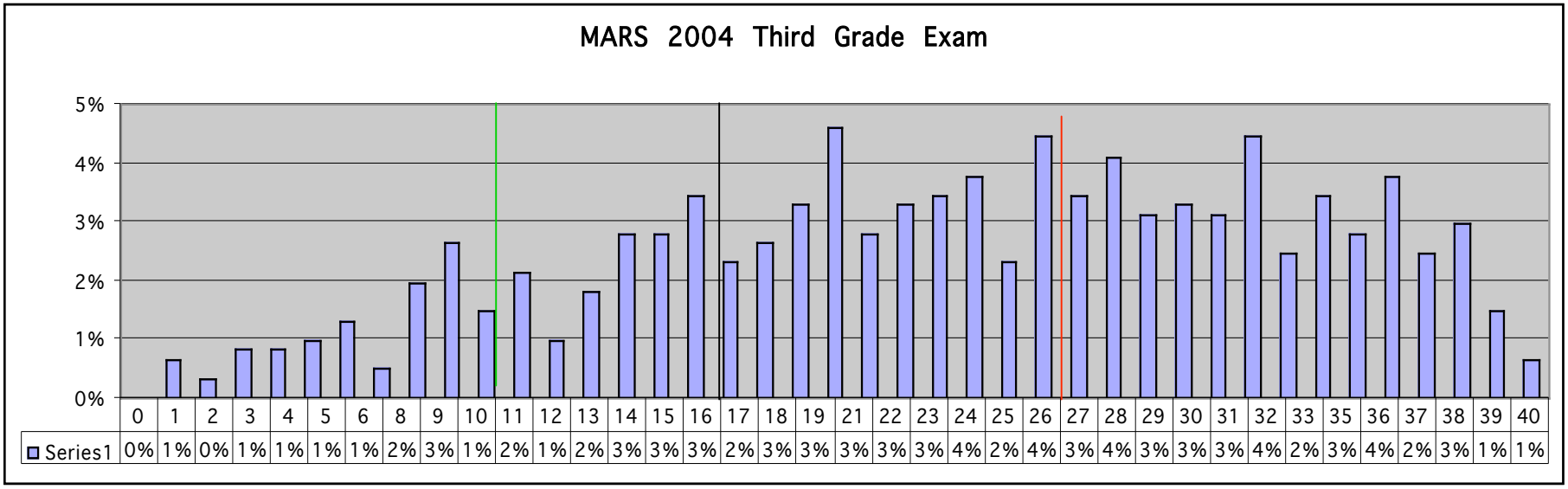
- The level of performance are based on a process that involves local and national professional judgment, student paper reviews, and analysis of data from current and past years.

- During the process of establishing levels of performance, efforts are made to anchor the judgments to allow for longitudinal analysis.

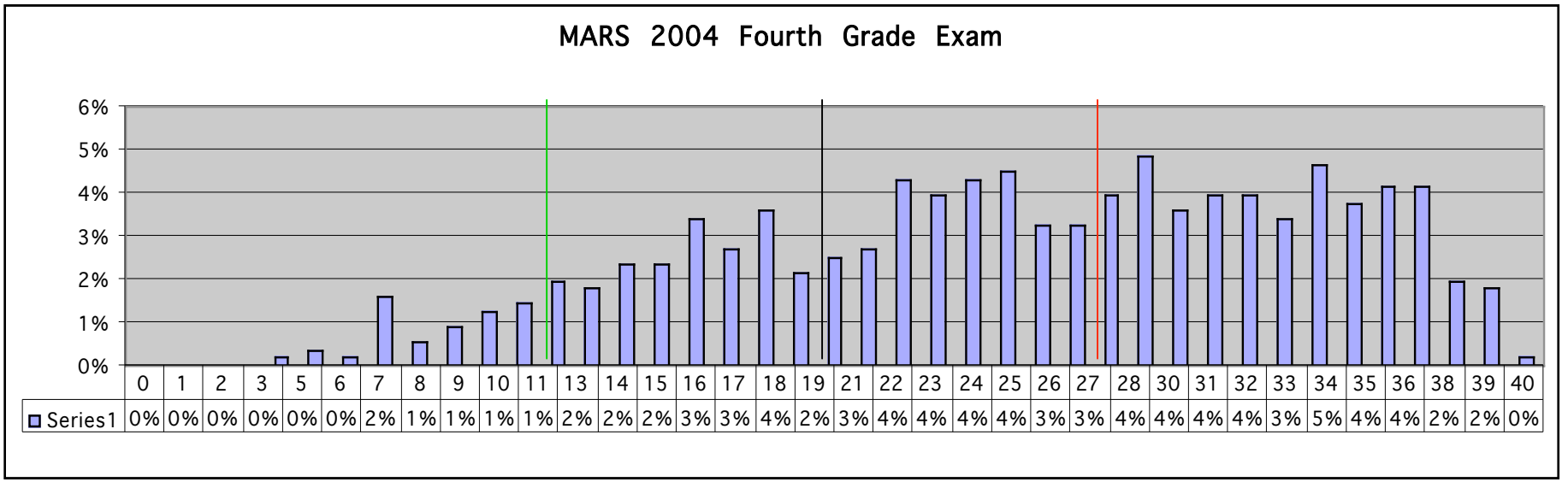
2004 Grade 2	Core Idea	Total Pts	Core Pts	% Core+
Teeth	Data Analysi	6	3	95%
Footsteps on the Ru	Measuremen	6	3	68%
Which Shape?	Geometry	5	3	62%
Agree or Disagree?	Algebra	6	3	59%
Student Store	Number	7	3	68%
Perf. Boundaries	ut Point Rang	% at	% at least	No. Students
1 Minimal Success	0 - 9	8%	100%	358
2 Below Standards	10 - 13	15%	92%	683
3 At Standards	14 - 20	37%	77%	1,683
4 Standards at HL	21 - 30	41%	41%	1,866
Total		100%		4,585



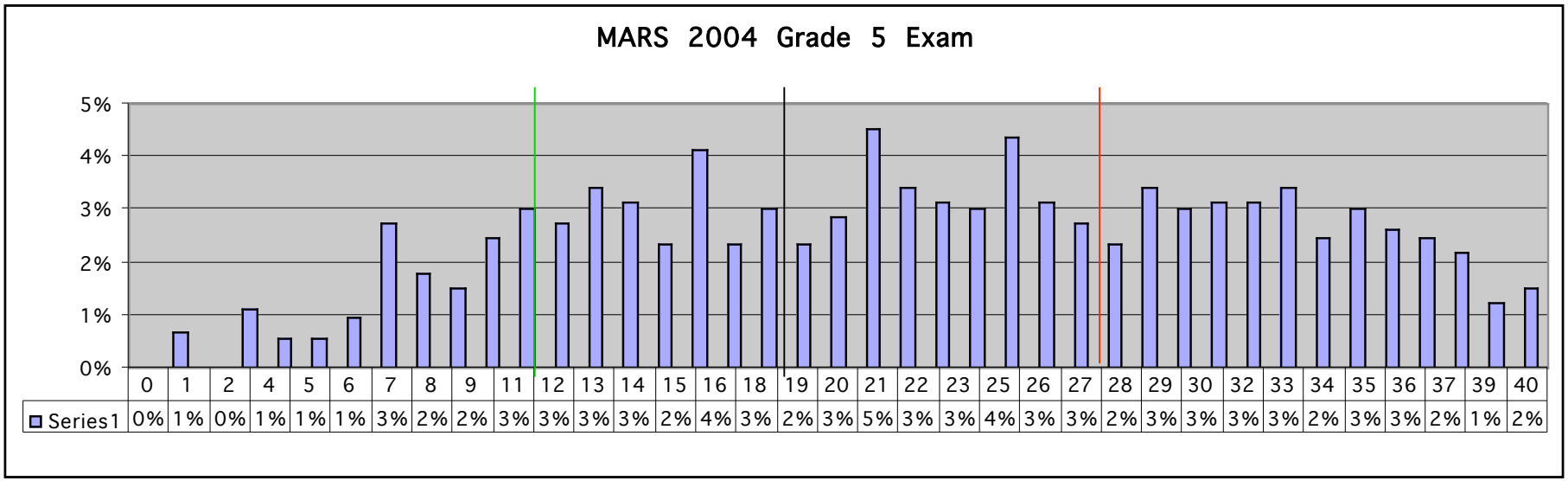
2004 Grade 3	Core Idea	Total Pts	Core Pts	% Core+
Dave's Pocket Money	Number Properties	6	3	65%
Tropical Fish	Data Analysis	9	5	84%
Symbols	Algebra	10	4	69%
Boxing the Pots	Measurement	8	3	61%
A Silly Story	Number Operations	7	3	37%
Perf. Boundaries	Cut Point Range	% at	% at least	No. Students
1 Minimal Success	0 - 10	14%	100%	2,185
2 Below Standards	11 - 16	17%	86%	2,638
3 At Standards	17 - 26	32%	69%	4,932
4 Standards at HL	27 - 42	38%	38%	5,853
Total		100%		15,608



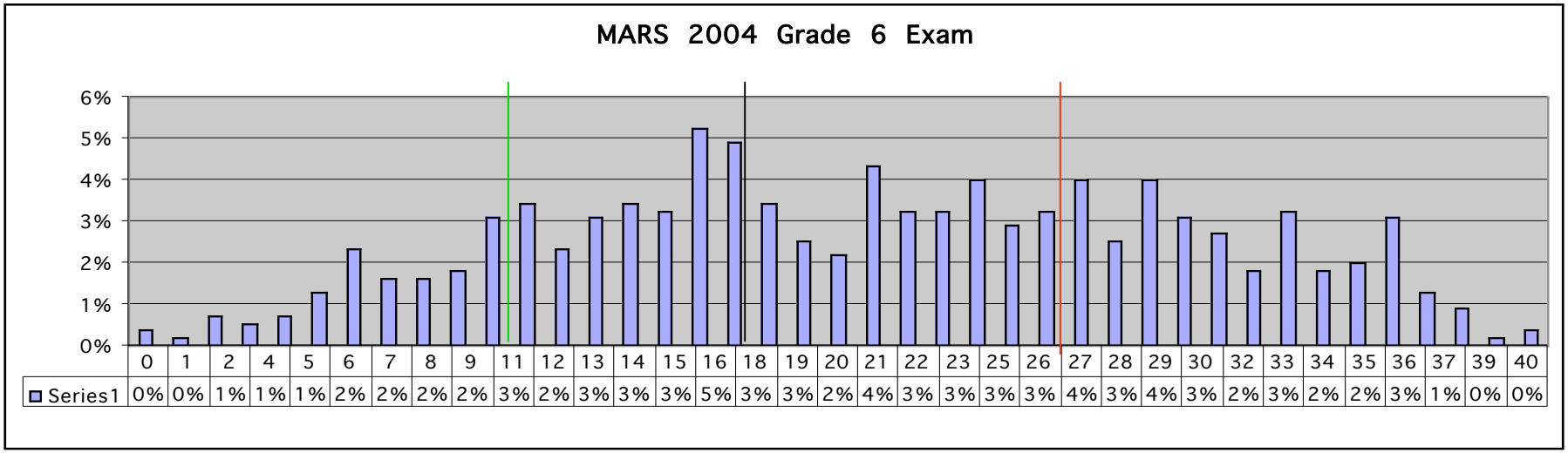
2004 Grade 4	Core Idea	Total Pts	Core Pts	% Core+
Saturday Afternoon	Number Ope	7	4	67%
Chips and Soda	Data Analysi	10	5	82%
Piles of Oranges	Algebra	8	4	59%
Symmetrical Pattern	Geometry	8	4	91%
Counting Feet	Number Prop	7	3	59%
Perf. Boundaries	ut Point Rang	% at	% at least	No. Students
1 Minimal Success	0 - 11	7%	100%	746
2 Below Standards	12 - 18	18%	93%	1,798
3 At Standards	19 - 27	34%	75%	3,453
4 Standards at HL	28 - 40	41%	41%	4,220
Total		100%		10,217



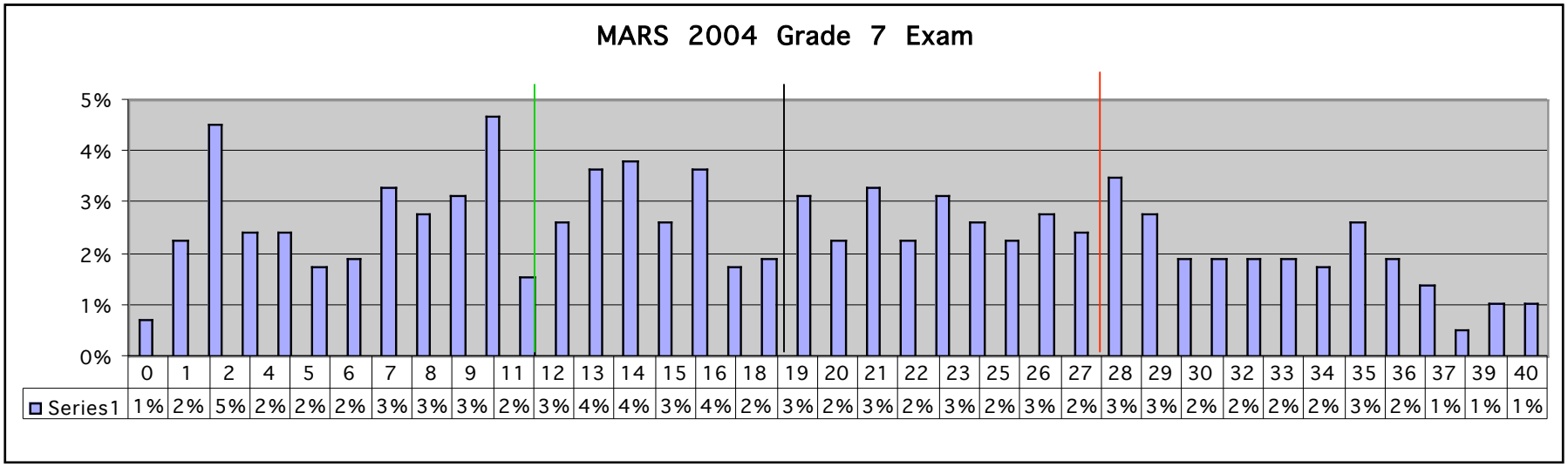
2004 Grade 5	Core Idea	Total Pts	Core Pts	% Core+
Boats	Number Ope	10	4	72%
How Many Cubes?	Geometry	7	4	57%
Fruits and Vegetable	Measuremen	8	3	63%
Playing Games	Algebra	10	5	63%
Fractions	Number Prop	5	3	59%
Perf. Boundaries	ut Point Rang	% at	% at least	No. Students
1 Minimal Success	0 - 11	17%	100%	2,434
2 Below Standards	12 - 18	20%	83%	2,876
3 At Standards	19 - 28	25%	63%	3,587
4 Standards at HL	29 - 40	38%	38%	5,339
Total		100%		14,236



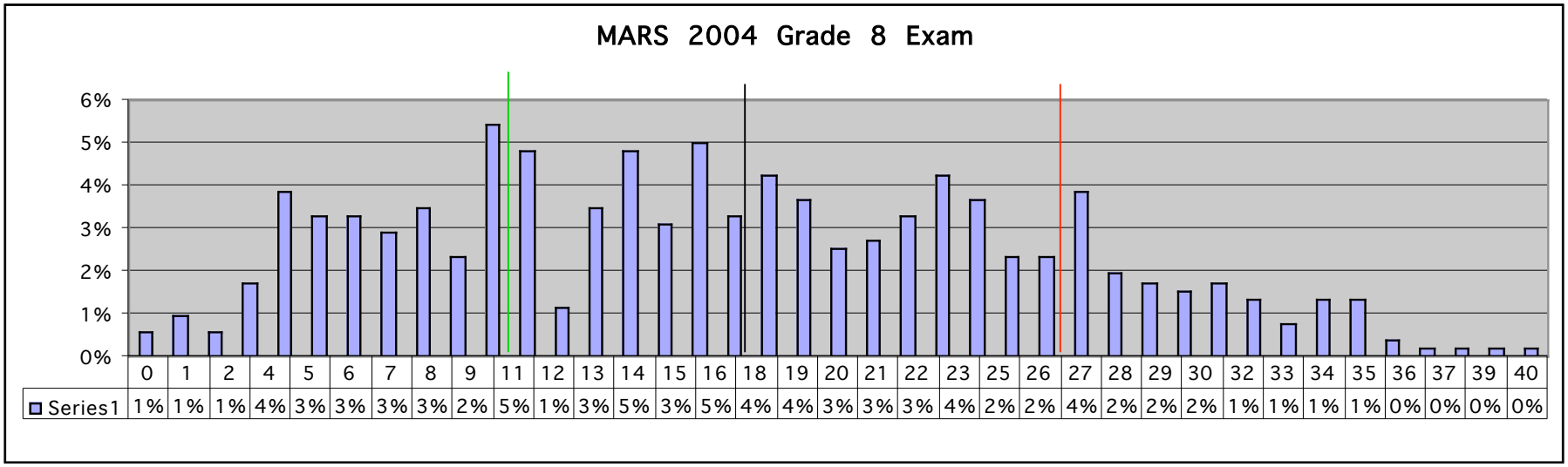
2004 Grade 6	Core Idea	Total Pts	Core Pts	% Core+
Candy Bars	Number	5	3	61%
Biggest	Algebra	10	4	66%
Meals	Data Analysi	8	4	63%
Parallelograms	Geometry	8	5	46%
School Days	Probability	9	4	34%
Perf. Boundaries	ut Point Rang	% at	% at least	No. Students
1 Minimal Success	0 - 10	17%	100%	1,954
2 Below Standards	11 - 17	27%	83%	3,062
3 At Standards	18 - 26	31%	56%	3,530
4 Standards at HL	27 - 40	25%	25%	2,879
Total		100%		11,424



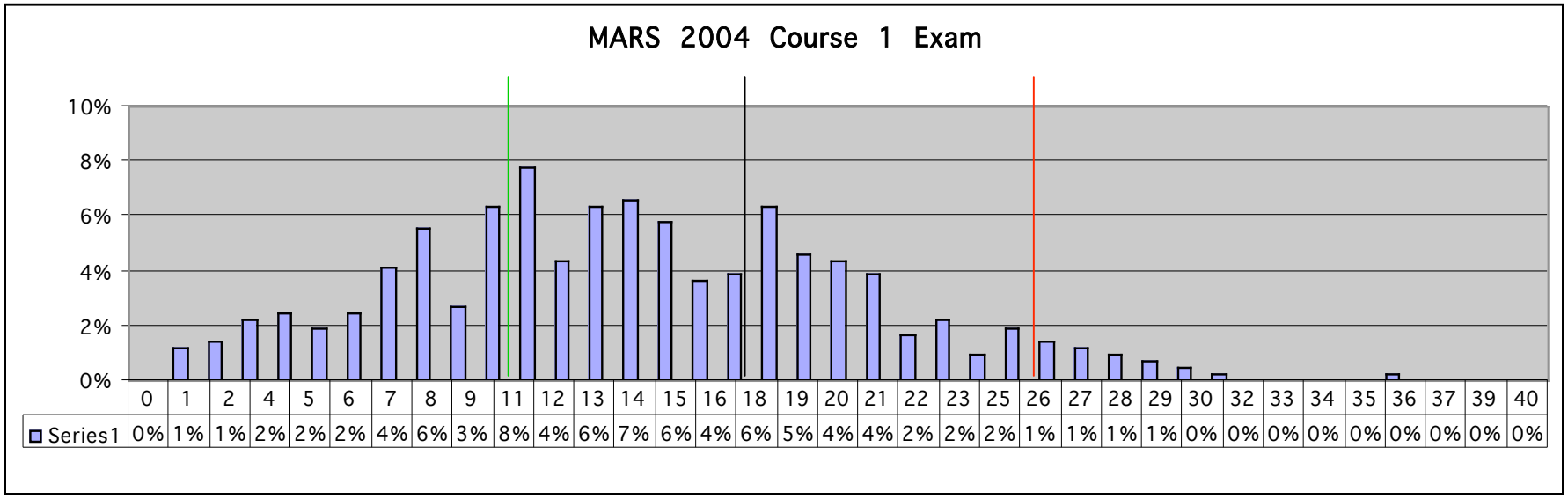
2004 Grade 7	Core Idea	Total Pts	Core Pts	% Core+
Quiz	Data Analysi	8	4	71%
Cereal	Number	7	3	45%
Special Offer	Number	8	4	39%
Counters	Probability	10	5	25%
Which is Bigger?	Geometry	7	4	42%
Perf. Boundaries	ut Point Rang	% at	% at least	No. Students
1 Minimal Success	0 - 11	36%	100%	4,409
2 Below Standards	12 - 18	26%	64%	3,140
3 At Standards	19 - 27	20%	39%	2,512
4 Standards at HL	28 - 40	18%	18%	2,254
Total		100%		12,315



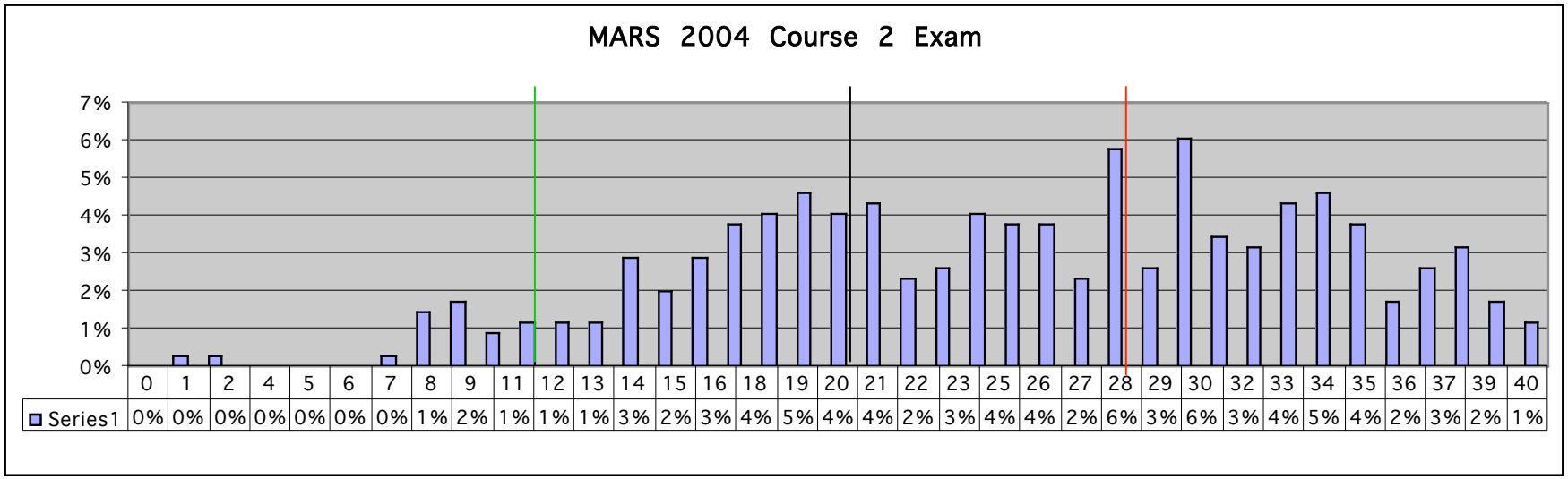
2004 Grade 8	Core Idea	Total Pts	Core Pts	% Core+
Merritt Bakery	Measuremen	8	5	41%
Odd Numbers	Number	8	4	72%
Party	Algebra	10	5	54%
Hexagons	Geometry	9	4	15%
Annimals	Data Analysi	5	3	41%
Perf. Boundaries	ut Point Rang	% at	% at least	No. Students
1 Minimal Success	0 - 10	27%	100%	2,851
2 Below Standards	11 - 17	26%	74%	2,743
3 At Standards	18 - 26	31%	48%	3,303
4 Standards at HL	27 - 40	17%	17%	1,861
Total		100%		10,758



2004 Course 1	Core Idea	Total Pts	Core Pts	% Core+
Square Patterns	Function	9	5	39%
Population	Data Analysi	8	4	31%
From 2 to 3 Dimensi	Geometry	8	4	21%
Graphs	Function	8	4	18%
Fibonacci Sequences	Algebra	7	3	65%
Perf. Boundaries	ut Point Rang	% at	% at least	No. Students
1 Minimal Success	0 - 10	39%	100%	596
2 Below Standards	11 - 17	39%	61%	595
3 At Standards	18 - 25	19%	23%	297
4 Standards at HL	26 - 40	3%	3%	52
Total		100%		1,540

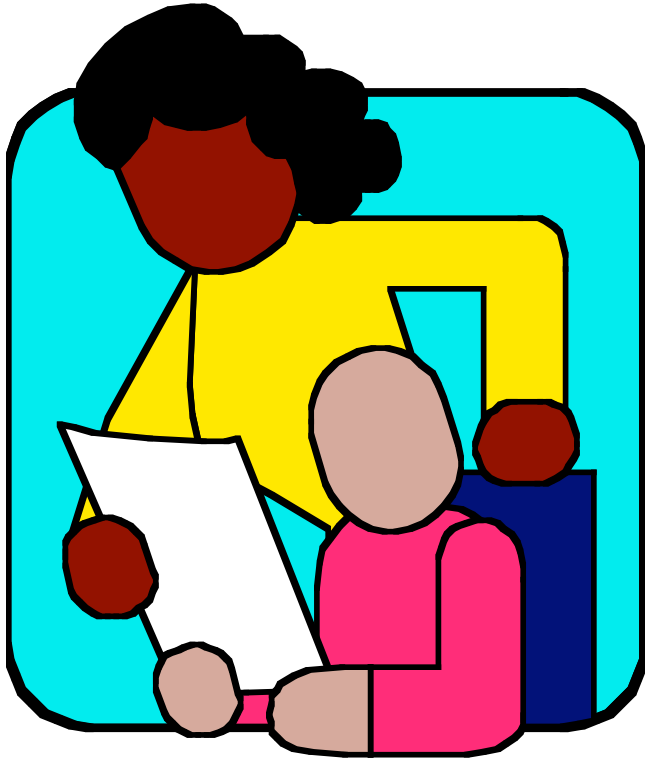


2004 Course 2	Core Idea	Total Pts	Core Pts	% Core+
Rectangle wit Fixed Area	Measurement	9	5	86%
At the Gym	Geometry	8	4	41%
Bird's Eggs	Data Analysis	7	4	78%
Pentagon's	Geometry	8	4	65%
Differences	Algebra	8	4	78%
Perf. Boundaries	Cut Point Range	% at	% at least	No. Students
1 Minimal Success	0 - 11	6%	100%	21
2 Below Standards	12 - 20	27%	94%	92
3 At Standards	21 - 28	29%	67%	100
4 Standards at HL	29 - 40	38%	38%	133
Total		100%		346

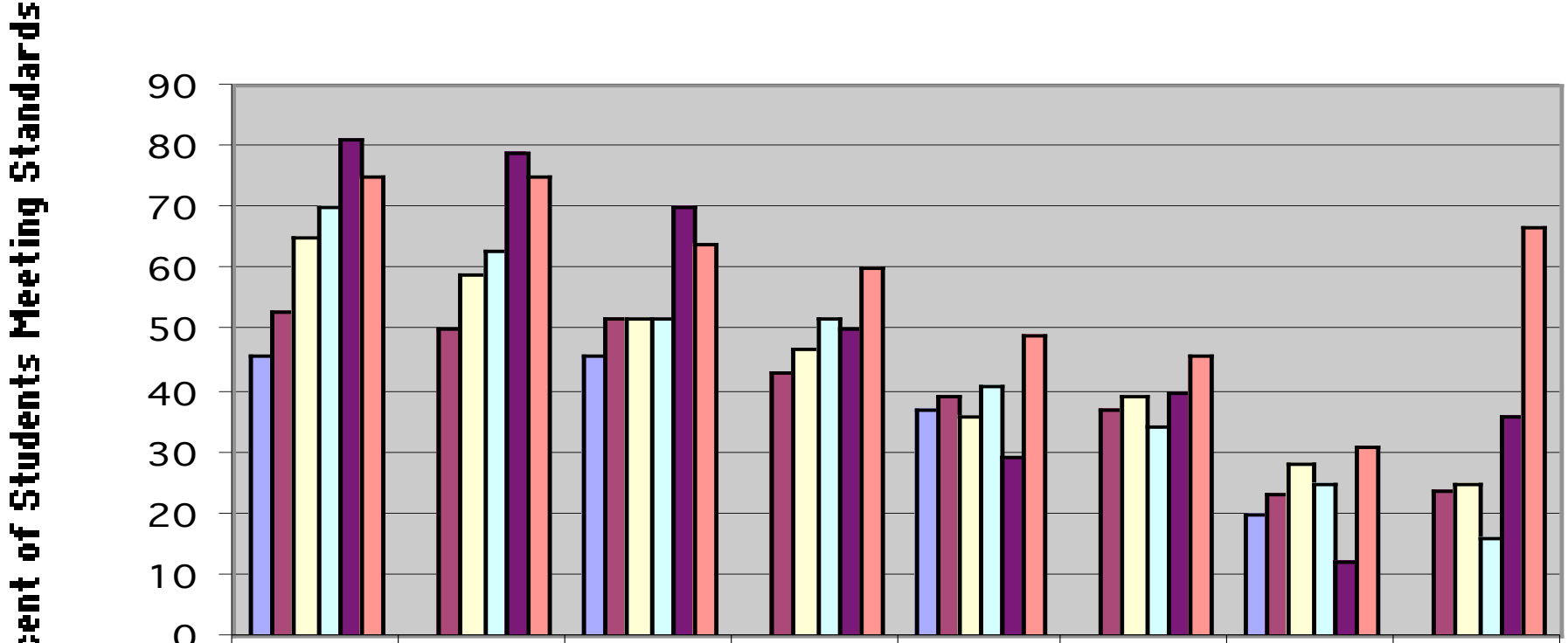


Examining MARS Achievement

- What trends do we see in the data?
- Where have we been most successful?
- Where have we seen the most recent growth?
- Where do we need to center our focus?



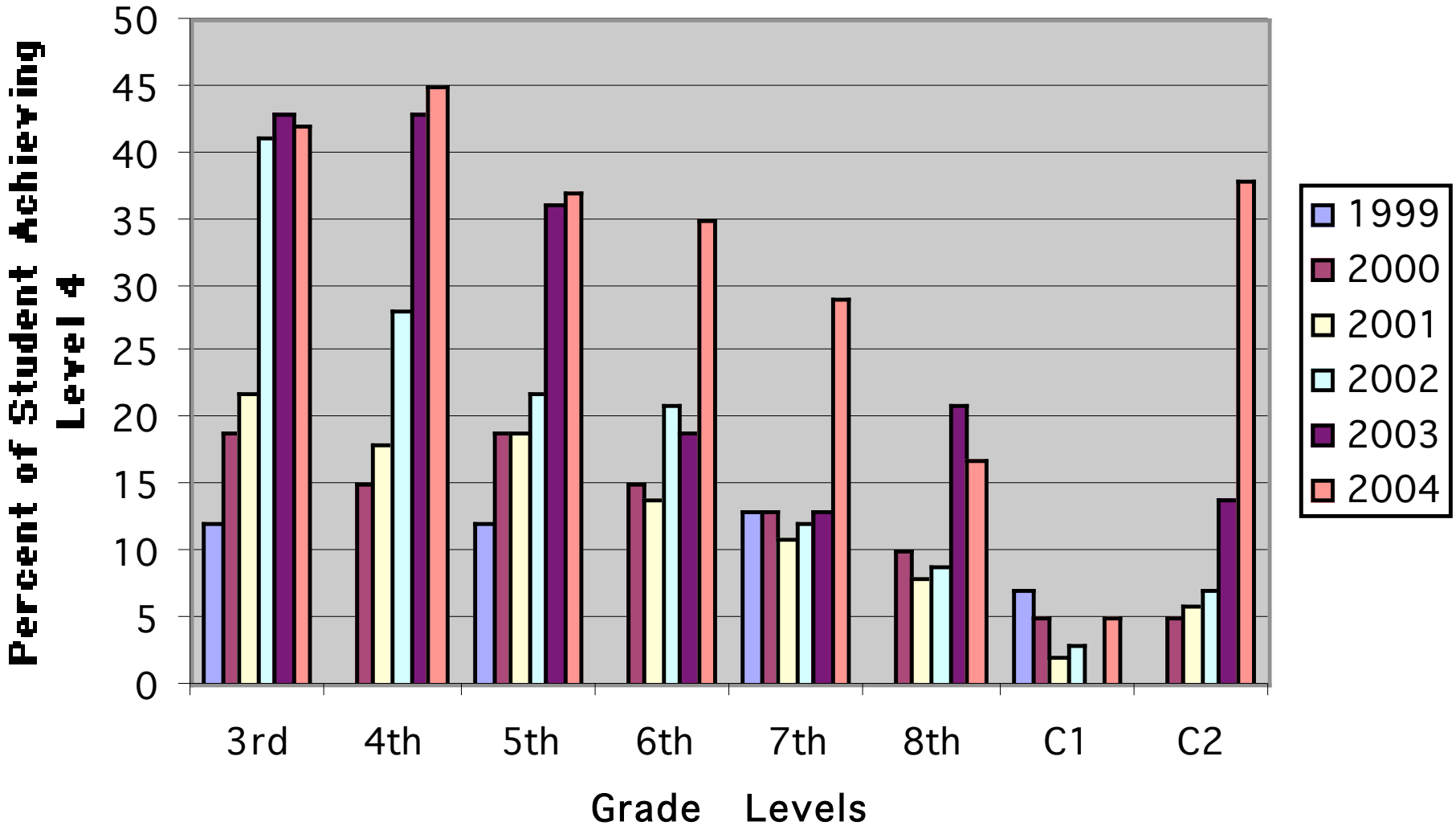
SVMI MARS Exam 1999 - 2003 Student Meeting Standards (Levels 3 and 4)



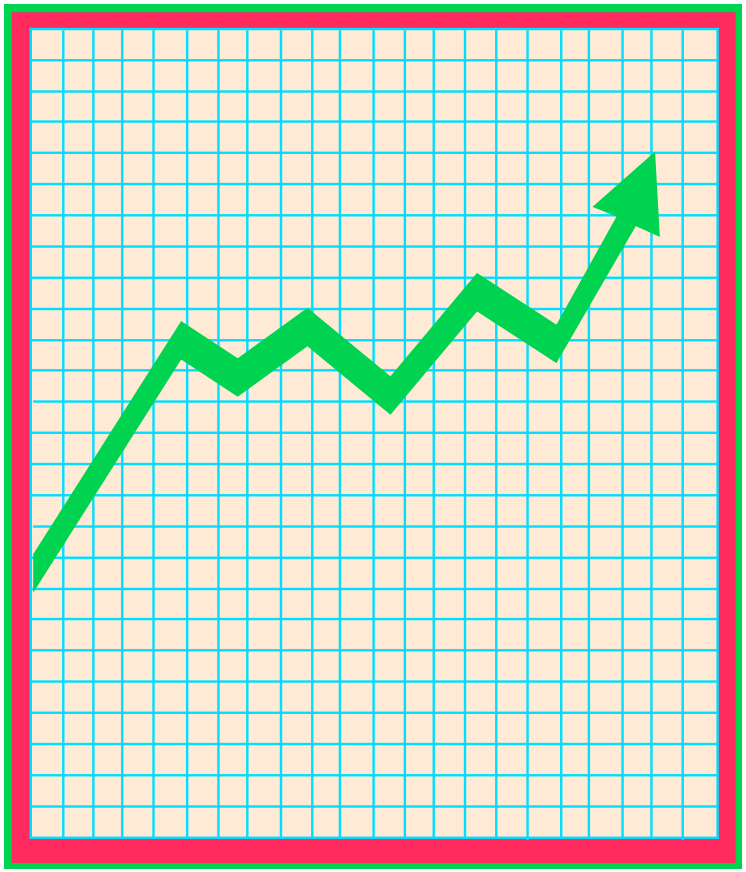
	3rd	4th	5th	6th	7th	8th	C1	C2
1999	46		46		37		20	
2000	53	50	52	43	39	37	23	24
2001	65	59	52	47	36	39	28	25
2002	70	63	52	52	41	34	25	16
2003	81	79	70	50	29	40	12	36
2004	75	75	64	60	49	46	31	67

Grade Levels

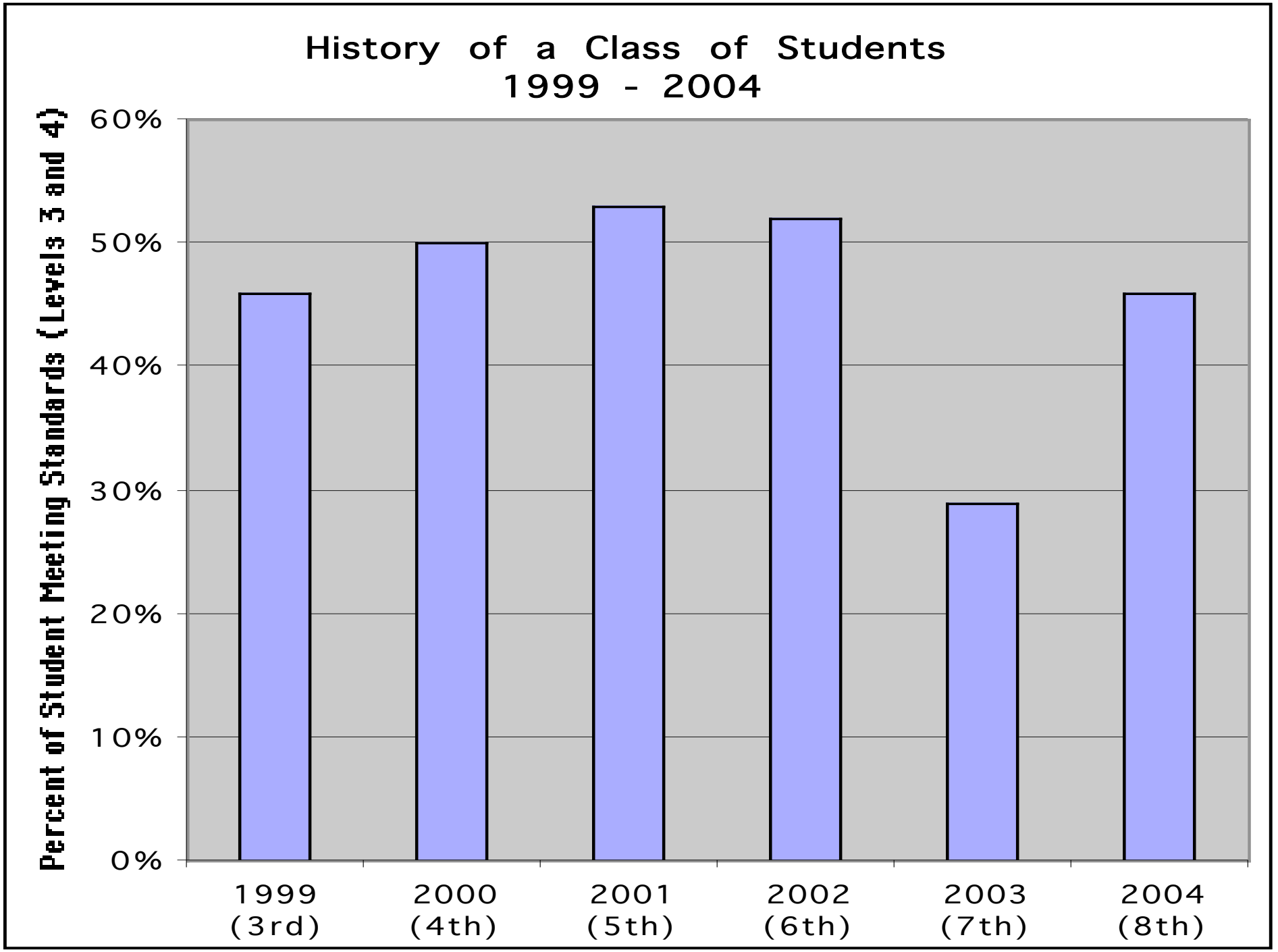
SVMI MARS Exam 1999-2003
Students Achieving Highest Level (4)



Tracking Trends Over Time



- How have students performed over time?
- What factors and variables affect the data?
- What conclusions can we draw?
- How should this inform our work?

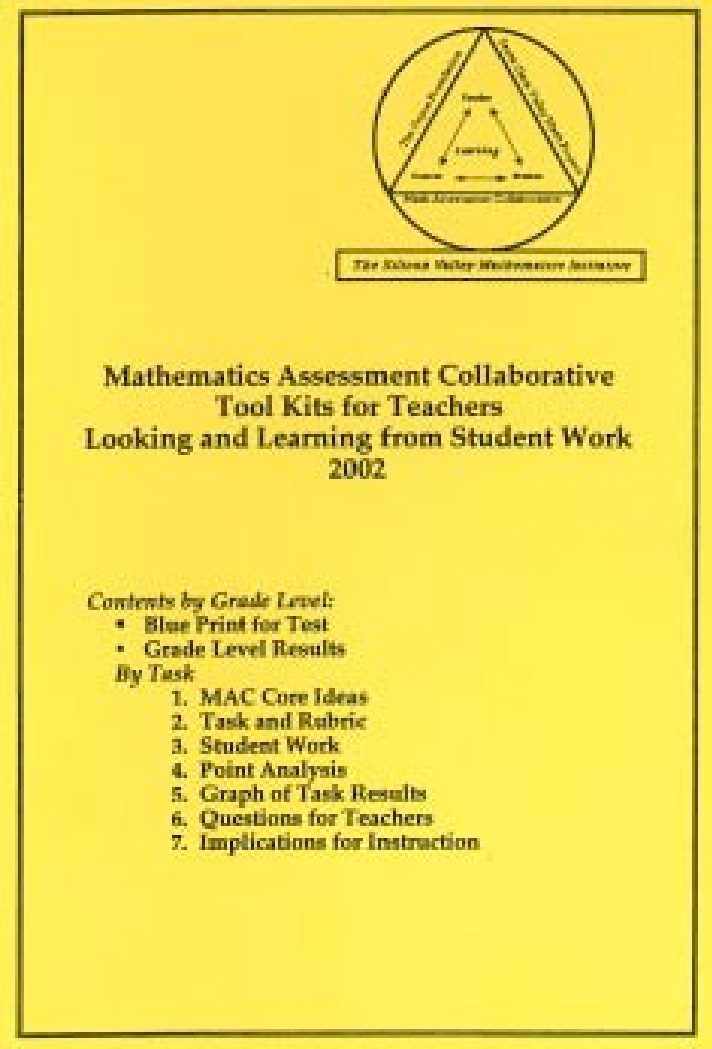

History of a Class of Students
1999 - 2004
Percent of Student Meeting Standards (Levels 3 and 4)
60%
50%
40%
30%
20%
10%
0%
1999 (3rd)
2000 (4th)
2001 (5th)
2002 (6th)
2003 (7th)
2004 (8th)

Answers to
No Child Left Behind

- Teach for Meaning
- Focus on Big Ideas
- Address Student Thinking
- Invest in Teachers' Professional Development

Mathematics Assessment Collaborative's

Tools for Teachers

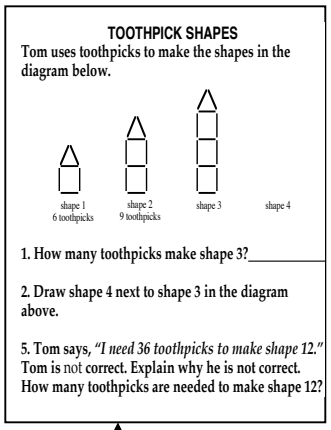


Authored by MAC Director Linda Fisher

Using Results from the MARS Exam and Students' Work To Inform Instruction

Collectively score and analyze student work

Administer quality assessment tasks



TOOTHPICK SHAPES

Tom uses toothpicks to make the shapes in the diagram below.

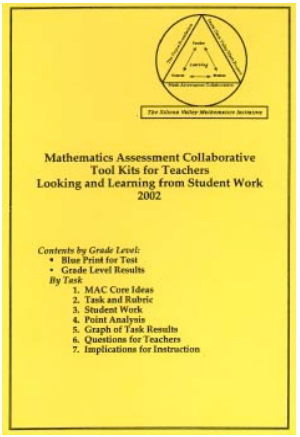
shape 1 — 6 toothpicks; shape 2 — 9 toothpicks; shape 3; shape 4

1. How many toothpicks make shape 3?_____

2. Draw shape 4 next to shape 3 in the diagram above.

5. Tom says, *"I need 36 toothpicks to make shape 12."* Tom is not correct. Explain why he is not correct. How many toothpicks are needed to make shape 12?

Cycle of Formative Assessment to Inform and Improve Learning



Mathematics Assessment Collaborative
Tool Kits for Teachers
Looking and Learning from Student Work
2002

Contents by Grade Level:
- Blue Print for Test
- Grade Level Results

By Task
1. MAC Core Ideas
2. Task and Rubric
3. Student Work
4. Point Analysis
5. Graph of Task Results
6. Questions for Teachers
7. Implications for Instruction

Document student thinking to inform instruction.

Drives the professional development experiences of the teachers.

Leads to improved teaching and learning in the classroom

Phi Delta Kappan, January 2004

The philosophy and history of the SVMI's Mathematics Assessment Collaborative is described in the January 2004 edition of Phi Delta Kappan.

TESTING: A SPECIAL SECTION

The Mathematics Assessment Collaborative:
Performance Testing to Improve Instruction

Thirty school districts in California have decided that the best way to counter the ill effects of mandatory high-stakes standardized testing in mathematics is to join together and institute their own performance assessments. Mr. Foster and Dr. Noyce report that the districts participating in the Mathematics Assessment Collaborative have seen improved mathematical understanding on the part of both their students and their teachers.

BY DAVID FOSTER AND PENDRED NOYCE, M.D.

AMERICAN schools are awash in standardized testing. Students are spending more and more time on state-mandated, high-stakes tests linked to state standards. There are variations among the states in terms of how often they test students, what subjects they test, whether their exams are norm- or criterion-referenced, and whether multiple-choice questions are supplemented by other question types. But the passage of the federal No Child Left Behind (NCLB) legislation makes it clear that, in the next few years, high-stakes

DAVID FOSTER is director of the Silicon Valley Mathematics Initiative and mathematics program director for the Robert N. Noyce Foundation, Palo Alto, Calif. PENDRED NOYCE, M.D., is a trustee of the Noyce Foundation and runs its Massachusetts office in Weston.

Illustration by John Berry

Individual Student Reports

Informs Parents of Student's Mathematical Strengths and Area to Focus Learning

- Informs parents to further engage their involvement.
- Emphasizes the importance of quality math instruction.
- Develops a culture and community around performance assessment.

Measuring Teacher's Pedagogical Content Knowledge

How do teachers involved in mathematics professional development provided by SVMI compare to other teachers around the country who are also involved in math in-services?

Pre- and Post- Surveys/Tests designed by the *Learning Mathematics for Teaching Project*,University of Michigan

Dr. Deborah Ball and Dr. Heather Hill

Measuring Teacher's Pedagogical Content Knowledge

"In checking differences between your group (Teachers attending the SVMI Institute, 2003) and the rest of the sample made up of other professional developer's tests, it appears your teachers are outperforming the rest of the groups by a significant amount -- often by 10% on any given item."

Dr. Heather Hill

Optimism

"Optimism is an essential ingredient for innovation. How else can the individual welcome change over security, adventure over staying in safe places? A significant innovation has effects that reach much further than can be imagined at the time, and creates its own uses. It will not be held back by those who lack the imagination to exploit its use, but will be swept along by the creative members of our society for the good of all. Innovation cannot be mandated any more than a baseball coach can demand that the next batter hit a home run. He can, however, assemble a good team, encourage his players, and play the odds."
Robert N. Noyce

"Don't be encumbered by history-- go off and do something wonderful."

Dr. Robert N. Noyce
Inventor of the Silicon Chip
Co-founder of Intel