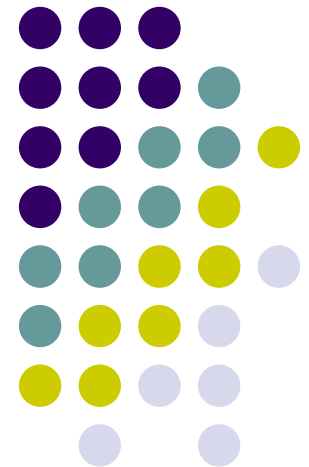


Florida's New World Class Education Mathematics Standards

Process and Progression

Mary Jane Tappen, Executive Director
Todd Clark, Deputy Director
Florida's Office of Mathematics and
Science



Florida, Math Matters!

Florida's Goal



Building world class education standards for
Florida's students!

World Class Education Standards (WCES) are those standards that, when implemented through quality instruction and content, prepare our students to compete at the highest levels internationally.

Florida's New Mathematics Standards



- September 2006 – Framers
- October 2006 through January 2007 – Writers Draft K-8 Standards and Secondary Content Standards with Comment and Review from Framers
- February through March 2007 - Public Review and Mathematicians Review
- April through May 2007 – Revisions Based on Review
- August 2007 – Present New Standards to the State Board of Education

What Researchers Said About Our Mathematics Sunshine State Standards!



Florida's Mathematics Standards – *A Mile Wide, An Inch Deep*

- For Florida's Grades 1-7, the average number of mathematics grade level expectations (GLEs) = 83.3
- Singapore, the highest performing nation as measured by the Third International Math and Science Study, now called Trends in International Math and Science Study (TIMSS), has 15 GLEs per grade level



Example of Variation in Number of Grade Level Expectations (GLEs-grain size)

	1st	2nd	3rd	4th	5th	6th	7th	Mean
CA	25	31	38	43	27	36	40	34.3
FL	78	84	88	89	77	78	89	83.3
MO	20	27	31	33	34	38	34	31.0
MN	18	26	26	25	26	30	27	26.3
NY	56	45	52	56	67	64	63	56.4
KS	57	59	57	56	60	69	74	61.7

Mean number of GLEs by grade level across 42 state documents: 47

What Researchers Said About Our Mathematics Sunshine State Standards!



Research Group

- College Board
- International Center for Leadership in Education
- Singapore's Standards
- Fordham Foundation
- California, Indiana, and Massachusetts Standards
- Koret Task Force
- Achieve's America Diploma Project

Findings - Recommendations

- Too many topics, not enough depth, hodgepodge of topics with little coherence - vertically align topics
- Vague, not sufficiently detailed to guide curriculum – standards should be expressed succinctly, coherently, and with optimum brevity
- Lack of rigor - enhance the rigor from grade 5 on

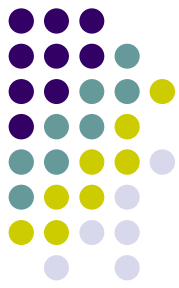
College Board



- Define grade-level expectations for grade 9-12
- Increase rigor of middle through high school standards
- Increase specificity of standards, showing a progressive development across grade levels
- Increase the depth of knowledge required as grades progress

College Readiness

Florida High School Graduates Requiring Remediation



Performance information for students who graduated from a public high school in Florida and attended a public college or university in Florida during the academic year immediately following high school graduation. (SUS – State University System, CC – Community College System)

% of Students	2003	2003	2004	2004	2005	2005
	SUS	CC	SUS	CC	SUS	CC
Mathematics	7%	54%	6%	47%	5%	52%
Reading	4%	42%	3%	36%	3%	41%
Writing	4%	29%	3%	26%	3%	27%

What we did?



- Formed multiple committees
 - Internal Department staff composed of K -12 curriculum specialists, community college staff, and university system
 - External international and national level experts to share the latest research and provide recommendations for improvement throughout the process
 - External Florida level experts including mathematicians, mathematics educators representing colleges and universities, K-12 mathematics teachers, teacher representatives from the Florida Council of Teachers of Mathematics, mathematics supervisors representing Florida's Association of Mathematics Supervisors, parent representative of Florida Parent Teacher Association, assessment specialists, and exceptional student education specialists

How did the process begin?



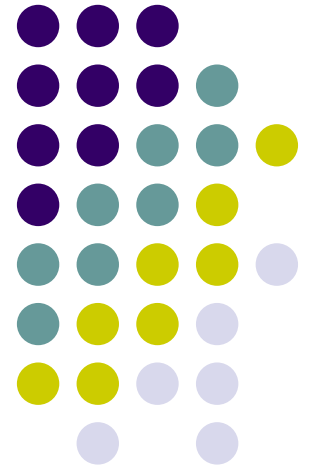
A group of external experts brought us the research

- **Dr. Barbara Reyes**, Center for the Study of Mathematics Curriculum (CSMC); shared a review of 42 state's mathematic standards
- **Dr. Jane Schielack**, Member of NCTM committee who wrote the recently released K-8 Mathematics Curriculum Focal Points
- **Dr. Kaye Forgione**, Senior Associate, Mathematics Benchmarking Initiative, Achieve, Inc.; America Diploma Project, what students need to know and be able to do to be successful in their future workplace
- **Dr. Alan Ginsburg**, US Department of Education, *What the United States Can Learn From Singapore's World-Class Mathematics System*
- **Dr. R. James Milgram**, Dr. Milgram rewrote the California Mathematics Standards for the California State Board of Education; California Standards were graded A

View their presentations: <http://flstandards.org>

Results

Florida's New World Class
Education Mathematics
Standards





Recommendations From External International and National Experts

- Increase rigor and specificity all the way around
 - K-8 - By grade level up to Algebra 1
 - Let NCTM's Focal Points be a guide
 - Reduce number of GLEs, focused in-depth instruction
 - Secondary - By Bodies of Knowledge
 - Algebra, Geometry, Probability, Statistics, Trigonometry, Discrete Math, Calculus, Financial Literacy
 - “Upper level” mathematics courses will use standards set by AP, IB, College Board, Dual Enrollment course guidelines/standards

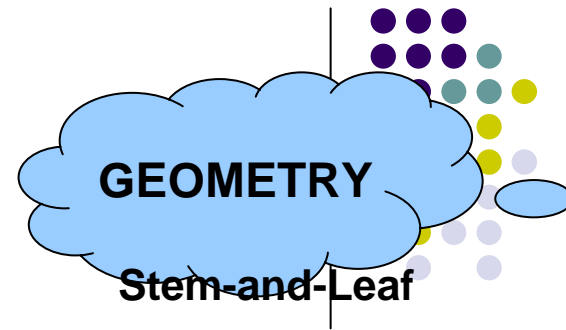


Bodies of Knowledge

- Bodies of Knowledge are not courses...
- ... So how are course descriptions made via the Bodies of Knowledge?

**Solving Linear
Equations**

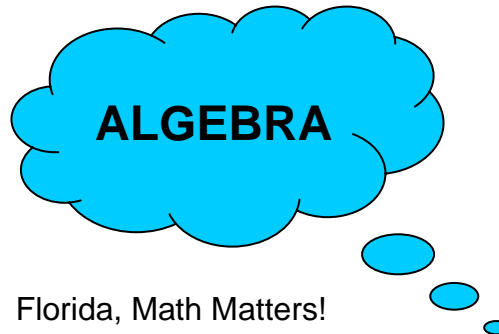
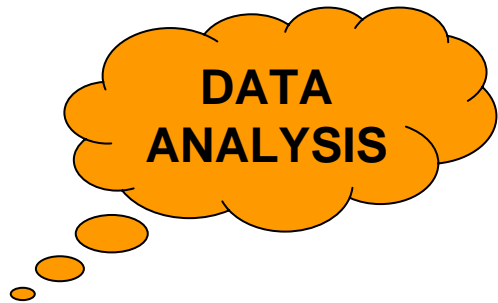
**Pythagorean
Theorem**



Example:

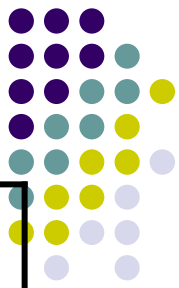
ALGEBRA I REGULAR

**COURSE
DESCRIPTION**



Florida, Math Matters!

World Class Mathematics Standards – Results: K-8 Narrower and Deeper



Grade Level	Number of Old Benchmarks	Number of New Benchmarks
Kindergarten	67	11
First	78	18
Second	84	21
Third	88	18
Fourth	89	22
Fifth	77	24
Sixth	78	18
Seventh	89	25
Eighth	93	23

World Class Mathematics Standards – Results: Secondary More Specific and Concise



Old 9-12 Benchmarks (Same for all 9-12)	New Body of Knowledge Benchmarks
<ul style="list-style-type: none">● 12 Benchmarks in Number Sense, Concepts, and Operations● 8 Benchmarks in Measurement● 5 Benchmarks in Geometry and Spatial Sense● 7 Benchmarks in Data Analysis and Probability	<ul style="list-style-type: none">● 86 Benchmarks for Algebra● 46 Benchmarks for Geometry● 9 Benchmarks for Probability● 26 Benchmarks for Trigonometry● 27 Benchmarks for Statistics● 52 Benchmarks for Calculus● 39 Benchmarks for Financial Literacy● 39 Benchmarks for Discrete Mathematics



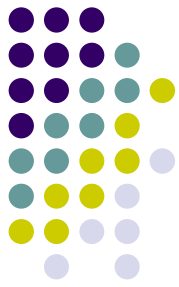
Web-based Public Review

- 43,025 total ratings of 504 benchmarks
- Ratings from all school districts
- 503 of 504 benchmarks 50% or more rated “agree” or “strongly agree”
- Ratings included public comment

Rating of “Strongly Agree”	% of Benchmarks
> 80%	7%
> 70%	25%
> 60%	54%
> 50%	80%
< 50%	20%

Web-based Public Review

1,391 Raters Completed the Visitor Profile



How they Identified Themselves:

- 50 as administrators
- 32 as district staff
- 37 as “other interested persons”
- 26 as parents
- 1,242 as teachers
- 4 no response

Administrators and Other District Staff Identified Themselves as:

- 5 Elementary Education
- 2 English
- 2 ESE
- 2 ESOL
- 1 Language Arts
- 13 Mathematics Education
- 1 Social Studies
- 56 no category

Expert Reviewers



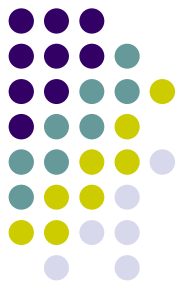
- Fordham – three reviewers
- Dr. Milgram –Stanford, California
- FCR-STEM – Education and Science of Arts Faculty
- FAMS – Florida Association of Mathematics Supervisors
- FCTM – Florida Council of Teachers of Mathematics
- FCAT Specs Committees
- Superintendents – invitation to review in February
- Content Stakeholders Advisory Committee - June

Public Information Meetings



- Leon County – teachers, pre-service teachers, district administrators
- Escambia – teachers, district administrators
- Ocala – FEA union representative, teachers, district administrators
- Hillsborough – parents, tutors, teachers, district administrators
- Palm Beach – teachers, district administrators

Florida's New Mathematics Standards, Example of Increase in Conciseness and Rigor



Out With the Old

3. Knows about measurement of time including A.M. and P.M., clocks and calendars

In With the New

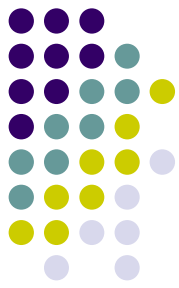
3. Tells time to the nearest minute and determines amount of time elapsed

Data Analysis and Probability

Analyzes real-world data and makes predictions of larger populations by applying formulas to calculate measures of central tendency and dispersion using the sample population data, and using appropriate technology, including calculators and computers.

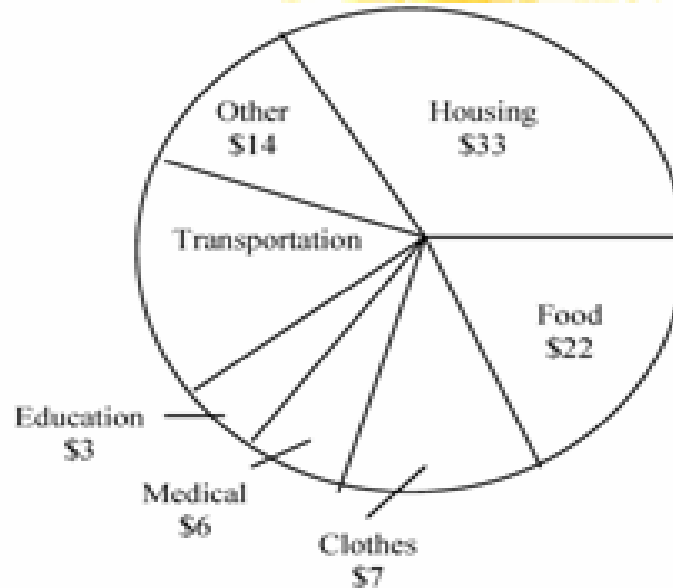
Statistics – Summarizing Data

Calculate and interpret measures of variance and standard deviation. Use these measures to make comparisons among sets of data.



U.S. Textbook Problems Emphasize Mechanical Formulas: Gr. 6 Pie Chart Requires Summing to a Total

Cost of Raising a Child to Age 18 (for each \$100)



- (a) What is the cost of transportation?
- (b) For each \$100 a parent spends raising a child to age 18, how much more is spent on housing and clothes than on education?
- (c) TEST PREP. For each \$300 spent, estimate how much is spent for food and clothes
1) \$329 2) \$90 3) \$29 4) \$130
- (d) Which costs are about twice as much as the cost of education? Five times as much? Eleven times as much?



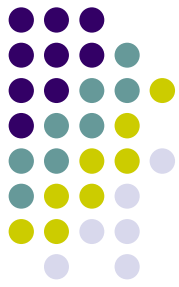
Singapore Textbooks Use Scaffolding Within Multi-step Problems :

Gr. 6 Pie Chart Problem Incorporating Angles

The pie chart represents the amount of money collected by various stalls at a funfair.



- What fraction of the total amount of money was collected by the games stalls?
- What was the total amount of money collected by the various stalls?
- How much money was collected by the music stalls?
- What was the ratio of the money collected by the food stalls to the money collected by the handicraft stalls?



What's Next?

- Complete mathematics in August
- Begin science in May
- Write new course descriptions for all mathematics courses
- Begin professional development with teachers
- Work with colleges of education to include new standards in pre-service education

Building World Class Science Standards for Florida



- Identified Experts

- Jean Slattery, Science Director for Achieve, Inc.
- Ted Willis, Project Director for Volume 2 of the Association for the Advancement of Science (AAAS) publication ATLAS of Science Literacy
- Bill Schmidt, Former U.S. Project Director for TIMMS

- Identified Framers

- | | |
|--------------------------|---------------------|
| ● Dr. Paul Cottle | Nuclear Physics |
| ● Dr. Horst Wahl | High Energy Physics |
| ● Dr. Harrison Prosper | High Energy Physics |
| ● Dr. Ron Goode | Science Education |
| ● Dr. Sherry Southerland | Science Education |
| ● Dr. Alice Winn | Biology |
| ● Dr. Michael Fauerbach | Astronomy |
| ● Dr. Paul Ruscher | Meteorology |

Projected Science Standards Timeline



- May – Framers define our process
- June through August – Writers draft the new standards
- Public Review – September – October
- Expert Review of Draft – November
- Prepare for Presentation to the State Board of Education - January



Other News

- The National Math and Science Initiative (NMSI), Exxon Mobile – AP Grant, Foundation for Florida’s Future, up to 13,000,000 Florida has made the first cut
- Exxon Mobile – Uteach
- NGA -

Your Questions and Input

