

Just Read, Florida!
August 6, 2007



Math & Science
Solutions for Florida's Future

Florida's New World-class Math Sunshine State Standards

World Class Education Standards (WCES) are defined as standards by subject area that require critical thinking and problem-solving skills, creativity and innovation skills, communication and information skills, and contextual and applied-learning skills that facilitate global competitiveness.

When implemented through quality instruction and content, these standards prepare our students to compete at the highest levels internationally.



Mathematics Standards

- Revisions began September 2006
- Adoption in September of 2007
- 2007-2008 Transition year
 - New course descriptions
 - Standards cross walk
 - Text book alignment
- 2008-2009 Implementation year
- 2010-2011 Assessment



Big Ideas

K-8

Grade Level	Number of <u>Old</u> Benchmarks	Number of <u>New</u> Benchmarks
K	67	11
1 st	78	14
2 nd	84	21
3 rd	88	17
4 th	89	21
5 th	77	23
6 th	78	19
7 th	89	22
8 th	93	19



What's Different?

Fewer but More Aligned Topics

Old Geometry K – 2 there is no specific benchmark for dividing shapes into parts for the purpose of building a foundation to understand the concept of fractions.

New Benchmark Grade 2, MA.2.G.5.1:

Use geometric models to demonstrate the relationships between wholes and their parts as a foundation for fractions.

Fractions are then introduced in grade 3.



What does this mean?

- ④ Fewer topics per grade, less repetition from year to year
- ④ Move from “covering” topics to teaching them in-depth for long term learning and building connections
- ④ Teachers will need to know how to introduce each new topic at the concrete level and move to the abstract and then connect it to other and more complex topics
 - ④ Students, build, draw, write and explain
They become mathematically literate!



What does this look like?

Grade 4 Example Lesson – Day 1

- ④ Provide each student with 30 cm^2 tiles and several sheets of cm^2 paper
- ④ Reintroduce cm^2 tiles and the concepts of squares and rectangles, request student volunteers build and share models of squares and rectangles and articulate the definitions for each
 - ④ Request students build as many rectangles and squares as possible using one up to all of the tiles and draw these models on their graph paper



Day 2

- ④ Ask students individually to identify for each number of tiles used, how many rectangles or squares can be built
- ④ Pair up students and have them compare and discuss their findings
- ④ Have student pairs share with the class their findings and communicate their defense for correctness
 - ④ When the correct total is agreed upon (58) provide students the opportunity to review their work to make any necessary improvements prior to the next step (teacher reviews for correctness)



Day 3

- Have students list the numbers of tiles from which:
 - only one square or rectangle could be built
 - a square could be built
 - multiple rectangles and/or squares could be built
- Pair up students and have them compare and discuss their findings
- Have student pairs share with the class their findings and communicate their defense for correctness
 - When the correct responses are agreed upon provide students the opportunity to review their work to make any necessary improvements prior to the next step (teacher reviews for correctness)



Here are the solutions:

- 1, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 tiles only build one rectangle
- 1, 4, 9, 16, 25 tiles build squares
- 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 27, 28, 30 tiles build multiple rectangles and/or squares
- What mathematical concepts do these models represent?



More and More and More

This example lesson should take several more days to complete.

- Primes, composites, perfect squares

Other concepts by continuing this lesson:

- Number patterns

- Perimeter and addition facts

- Repeated addition (precursor to multiplication)

- Area and multiplication facts (precursor to factoring in algebra and use of algebra tiles)

- Prime factorization and factors

- Here is the vocabulary of mathematics



Applying These Concepts

📍 Make these concepts relevant by applying them:

📍 Using one sheet of your graph paper, design a floor plan for your first home that includes eight square and rectangular rooms. Your plan must include at least one perfect square and one rectangle with a prime area. Label all perimeters, areas, and room purposes.

Write a defense for your plan.



Related Benchmarks

- Grade 4: MA.4.A.1.1 *Use and describe various models for multiplication in problem-solving situations, and demonstrate recall of basic multiplication and related division facts with ease.*
- Grade 4: MA.4.G.3.2 *Justify the formula for the area of the rectangle “area= base x height”*
 - Grade 5: MA.5.A.2.4 *Determine the prime factorization of numbers*
(a concept needed to add and subtract fractions with unlike denominators)



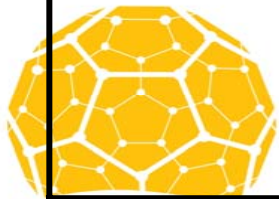
Bodies Of Knowledge 9-12

Old 9-12 Benchmarks (Same for all 9-12)

- 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

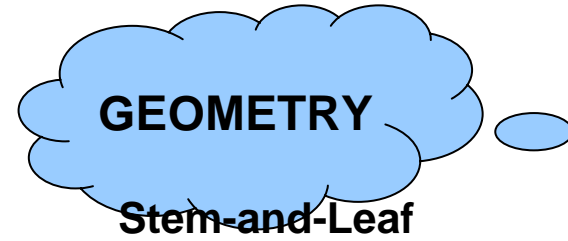
New Body of Knowledge Benchmarks

- 82 Benchmarks for Algebra
- 46 Benchmarks for Geometry
- 9 Benchmarks for Probability
- 28 Benchmarks for Statistics
- 24 Benchmarks for **Trigonometry**
- 51 Benchmarks for **Calculus**
- 39 Benchmarks for **Financial Literacy**
- 41 Benchmarks for **Discrete Mathematics**



**Solving Linear
Equations**

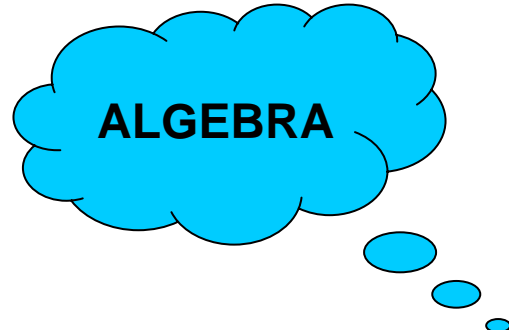
**Pythagorean
Theorem**



Example:

ALGEBRA I REGULAR

**COURSE
DESCRIPTION**



What's Different?

Benchmarks Specific to Content

Old Data Analysis and Probability had **seven** benchmarks to guide instruction for a statistics course

New We now have 9 benchmarks for Probability and 28 benchmarks for Statistics to guide instruction in Florida's four approved courses in this area as well as other courses where these benchmarks would be applicable



What's Different?

Benchmarks Specific to Content

Old Measurement, we had **eight** benchmarks in measurement but no direction on where and when they should be taught

New We have no “Measurement” Body of Knowledge, our Bodies of Knowledge relate to math content areas, not topics within mathematics, for example: MA.912.G.6.4
Find and use measures of arcs and related angles (central inscribed, and intersections or secants and tangents)

What's Different?

Benchmarks Specific to Content

Old There were **NO** benchmarks to guide instruction in Financial Literacy, Trigonometry, Discrete Mathematics, and Calculus

New Now there ARE!



What does this mean?

- Teachers will now have content specific benchmarks to lead their instruction, no longer being dependent upon the text for the content of the course they are teaching
- End-of-course exams and pre-tests can be built from the benchmarks listed in course descriptions
 - Administrators will know exactly what benchmarks are to be taught in each course

Being Mathematically Literate

- ④ Communicate mathematically using the correct vocabulary
- ④ Write and describe mathematical processes

Strategies - Require

- ④ Note taking, written responses
 - ④ Students to describe how they solved a problem
 - ④ Standards notebooks with written descriptions and examples



Planned Resources

- ④ Course Descriptions
- ④ Glossaries for each grade level and Body of Knowledge
- ④ Listing of literal equations for each grade level and Body of Knowledge

World-class Policies

- Graduation requirements
 - 2007-2008 9th grade students will be required to earn four credits in mathematics for graduation including Algebra I or equivalent (2003 – 2006 ~ 40% graduated with four credits)
 - Eight other states already require credit in Algebra II, eight more require credit in Geometry
 - 2009 12th grade NAEP will include Geometric Proof



Support

Math Science Partnership Grants

Fldoestem.org

- Math Matters!
 - On-line PD for teachers, digital materials
- Florida's Next Round of Math & Science Partnership Funding
 - \$8 million for each of three years will be dedicated to teacher professional development on the new standards



Support Florida & Islands Comprehensive Center - FLICC

Middle School Mathematics Initiative

Professional development for middle grades mathematics teachers, priority for 6th grade, bringing rigor and relevance to instruction.



Florida's Center for Research in Science, Technology Engineering, and Mathematics – FCR-STEM

- 📍 Announced by Governor Crist February 2007
- 📍 Florida State University

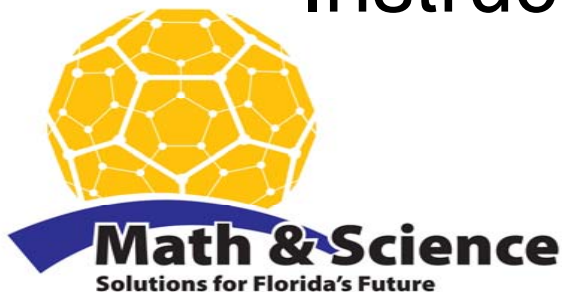
The mission of FCR-STEM is to help the State of Florida improve K-12 teaching and learning in science, technology, engineering, and mathematics and prepare students for higher education and STEM careers in the 21st Century.



FCR-STEM

Supporting Research

- Elementary Mathematics Curricula
- Professional Development Approaches to Reform-based Curriculum
- Texas Instruments Model Districts Program
- Superior Performance in AP
 - Technology-based Math & Science Instruction



FCR-STEM

Support Projects

- Standards database and course description tools
- FSU-Teach
- Math and science progress monitoring system
- PD on Content Enhancement Routines
 - 20 Internet-based teaching modules



How Can You Help?

Public Relations!

- 🌐 Believe students need math and science
- 🌐 Encourage teachers to learn more about their content
- 🌐 Provide classrooms with hands-on learning tools
- 🌐 Be aware of what good math and science instruction looks like and support it

The students should be doing the work!



2007 Sunshine State Scholar

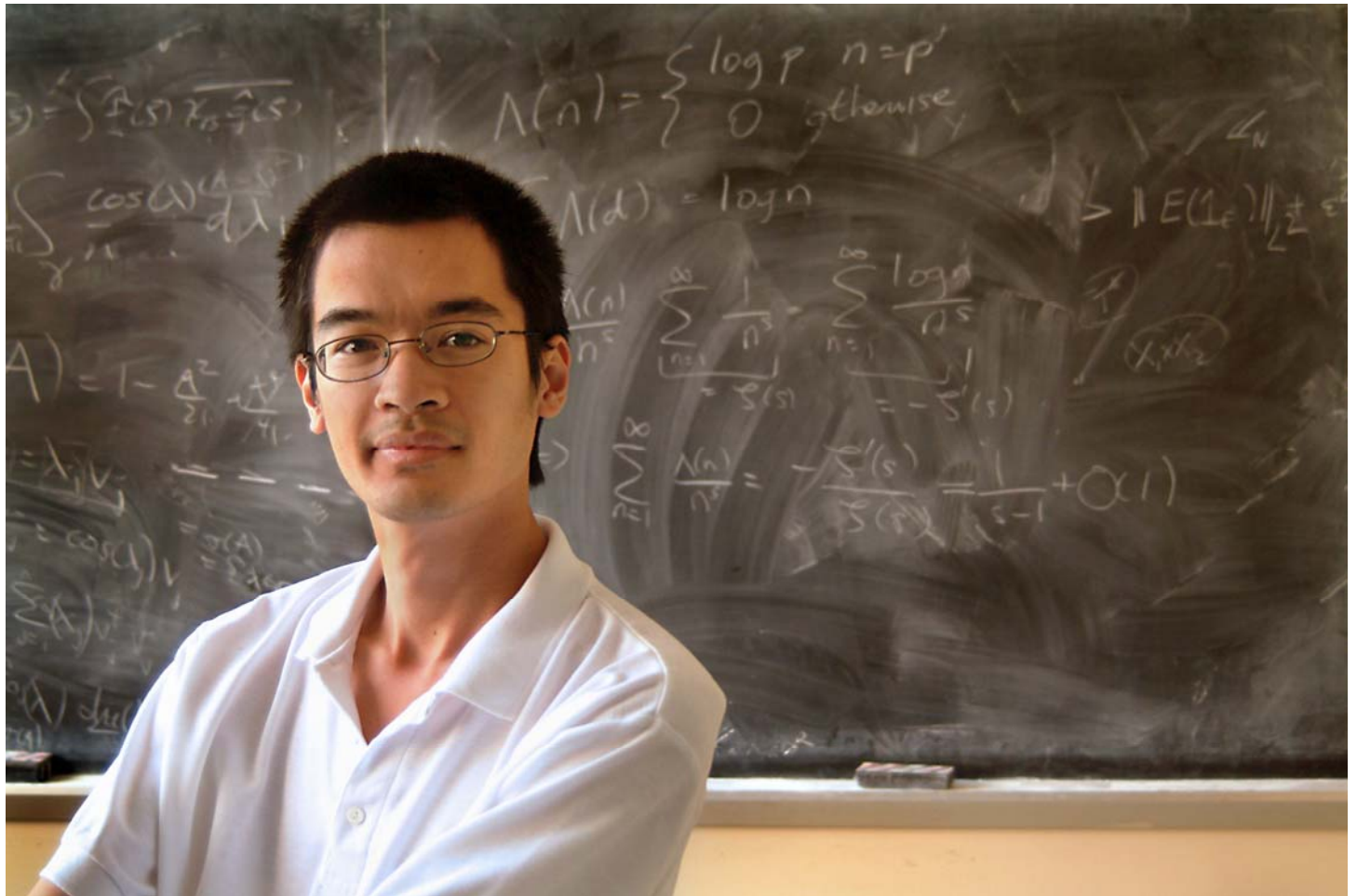
Casey Hua

Seminole High School

- Interested in pursuing biomedical research, her advice:
 - Funnel elementary students curiosity early and keep them engaged in science and math (for her a 5th grade gifted program)
 - Extra incentives for competition sponsors (students meet other talented peers at these events)
 - Make students think, hands-on activities, creativity, like Ms. Morgan her physics teacher
 - Let's see some cool science and math folks, not just pictures of old scientists!



Meet Terence Tao, Colleagues Teasingly Call Him a Rock Star



Send Us Your Star Scientist or Mathematician to Place

HERE!

