Gearing Up for the Common Core State Standards in Mathematics

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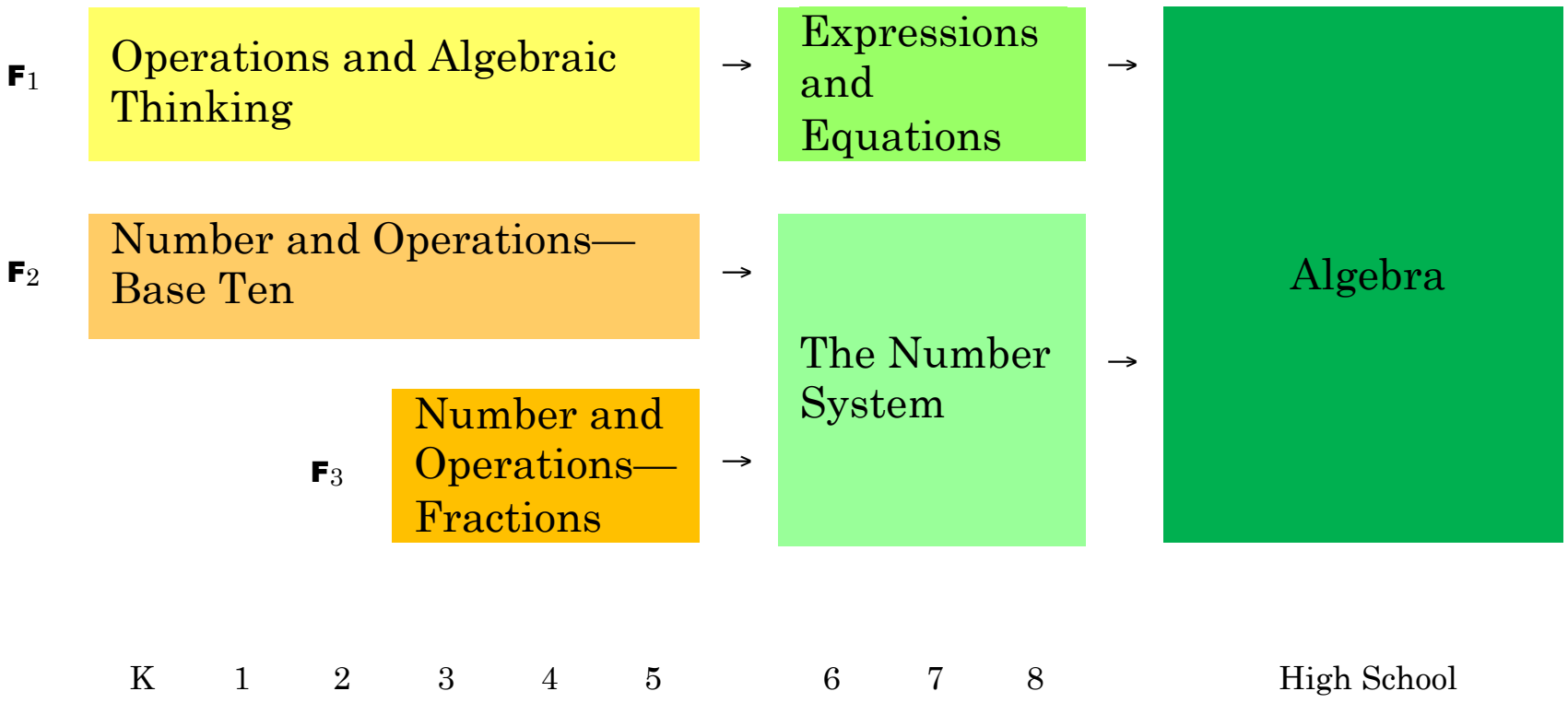
Tucson, 1 April 2011

How do we achieve focus?

Counting & Cardinality						Ratios & Proportional Relationships		
Operations and Algebraic Thinking						The Number System		
Number and Operations in Base Ten						Expressions and Equations		
			Fractions					Functions
Measurement and Data								
Geometry						Geometry		
						Statistics and Probability		
K	1	2	3	4	5	6	7	8

How do we achieve coherence?



Structures in the standards

	Operations and Algebraic Thinking	Number and Operations in Base Ten	Fractions
1	Understand and apply properties of operations and the relationship between addition and subtraction.	Use place value understanding and properties of operations to add and subtract.	
2		Use place value understanding and properties of operations to add and subtract.	
3	Understand properties of multiplication and the relationship between multiplication and division.	Use place value understanding and properties of operations to perform multi-digit arithmetic.	
4		Use place value understanding and properties of operations to perform multi-digit arithmetic.	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
5			Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

High School

- Number and Quantity
  - ...
- Algebra
  - Seeing Structure in Expressions
  - Arithmetic with Polynomials and Rational Expressions
  - Creating Equations
  - Reasoning with Equations and Inequalities
- Functions
  - Intepreting Functions
  - Building Functions
  - Linear, Quadratic, and Exponential Models
  - Trigonometric Functions
- Modeling
  - ...
- Geometry
  - ...
- Statistics and Probability
  - ...

How do we achieve understanding?

Standards for Mathematical Practice

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

TEDS Lower Secondary Mathematics Knowledge and Teaching Mathematics Knowledge Scores

Mathematics Knowledge		
Country	**Mn**	**(se)**
Chinese Taipei	667	(3.9)
Russian Federation	594	(12.8)
Singapore	570	(2.8)
Poland	540	(3.1)
Switzerland	531	(3.7)
Germany	519	(3.6)
United States-Private	**512**	**(16.3)**
United States-Public	**505**	**(9.7)**
Malaysia	493	(2.4)
Thailand	479	(1.6)
Oman	472	(2.4)
Norway	444	(2.3)
Philippines	442	(4.6)
Botswana	441	(5.3)
Georgia	424	(8.9)
Chile	354	(2.5)

Teaching Knowledge		
Country	**Mn**	**(se)**
Chinese Taipei	649	(5.2)
Russian Federation	566	(10.1)
Singapore	553	(4.7)
Switzerland	549	(5.9)
Germany	540	(5.1)
Poland	524	(4.2)
United States-Private	**505**	**(13.0)**
United States-Public	**502**	**(8.7)**
Thailand	476	(2.5)
Oman	474	(3.8)
Malaysia	472	(3.3)
Norway	463	(3.4)
Philippines	450	(4.7)
Georgia	443	(9.6)
Botswana	425	(8.2)
Chile	394	(3.8)

Significantly above the U.S. - Public

Not significantly different from the U.S. - Public

Significantly below the U.S. - Public

U.S. Teacher Education Study – Mathematics

TEDS Primary Mathematics Knowledge and Teaching Mathematics Knowledge Scores

Mathematics Knowledge	
Country	**Mn (se)**
Chinese Taipei	623 (4.2)
Singapore	590 (3.1)
Switzerland	543 (1.9)
Russian Federation	535 (9.9)
Thailand	528 (2.3)
United States-Private	**526 (3.6)**
Norway	519 (2.6)
United States-Public	**518 (4.1)**
Germany	510 (2.7)
Poland	490 (2.2)
Malaysia	488 (1.8)
Spain	481 (2.6)
Botswana	441 (5.9)
Philippines	440 (7.6)
Chile	413 (2.1)
Georgia	345 (3.9)

Teaching Knowledge	
Country	**Mn (se)**
Singapore	593 (3.4)
Chinese Taipei	592 (2.3)
Norway	545 (2.4)
United States-Private	**545 (3.1)**
United States-Public	**544 (2.5)**
Switzerland	537 (1.6)
Russian Federation	512 (8.1)
Thailand	506 (2.3)
Malaysia	503 (3.1)
Germany	502 (4.0)
Spain	492 (2.2)
Poland	478 (1.8)
Philippines	457 (9.7)
Botswana	448 (8.8)
Chile	425 (3.7)
Georgia	345 (4.9)

Significantly above the U.S. - Public

Not significantly different from the U.S. - Public

Significantly below the U.S. - Public

Goals of this workshop

- Identify initial content targets for professional development on the Standards
- Make recommendations on standards and clusters in the Standards where greater emphasis is needed
- Give examples illustrating the Standards for Mathematical Practice
- Identify content areas which can be deleted from current professional development efforts

Work plan

- Sample tasks are intended to generate discussion, not to serve as examplars
- Six multi-purpose groups will develop recommendations on the initial content focus of professional development on
  - K–8 content standards
  - high school content standards
  - practice standards
- Our goal is to develop consensus about the highest priorities for the content of initial professional development efforts
- Our goal is not to make recommendations about *how* to deliver professional development.
- Word and powerpoint templates for breakout groups available at `http://ime.math.arizona.edu`.