Curriculum Focal Points
for Prekindergarten through Grade 8 Mathematics:
A Quest For Coherence

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Why?

Why Identify Focal Points?

- Address long lists of state learning expectations
- Address "mile wide, inch deep" math curriculum
- Identify the mathematics that should be the focus of instruction and student learning, preK-8
- Begin the discussion of appropriate curricular expectations
- Identify key mathematical ideas all others build on

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CSMC

Center for the Study of Mathematics Curriculum

The Intended Mathematics Curriculum as Represented in
State-Level Curriculum Standards: Consensus or Confusion?

EXECUTIVE SUMMARY
WORKING DRAFT (April 14, 2006)

Number of 4th-Grade Learning Expectations per State by Content Strand

|	Number & Operation	Geometry	Measurement	Algebra	Data Analysis, Probability & Statistics	Total Number of Learning Expectations
California	16	11	4	7	5	43
Texas	15	7	3	4	3	32
New York	27	8	10	5	6	56
Florida	31	11	17	10	20	89
Ohio	15	8	6	6	13	48
Michigan	37	5	11	0	3	56
New Jersey	21	10	8	6	11	56
North Carolina	14	3	2	3	4	26
Georgia	23	10	5	3	4	45
Virginia	17	8	11	2	3	41

Reys, et al., 2006

What?

Principles
- Equity
- *Curriculum*
- Teaching
- Learning
- Assessment
- Technology

Content Standards
- Number/Operations
- Algebra
- Geometry
- Measurement
- Data/Probability

Process Standards
- Problem Solving
- Reasoning
- Communication
- Connections
- Representation
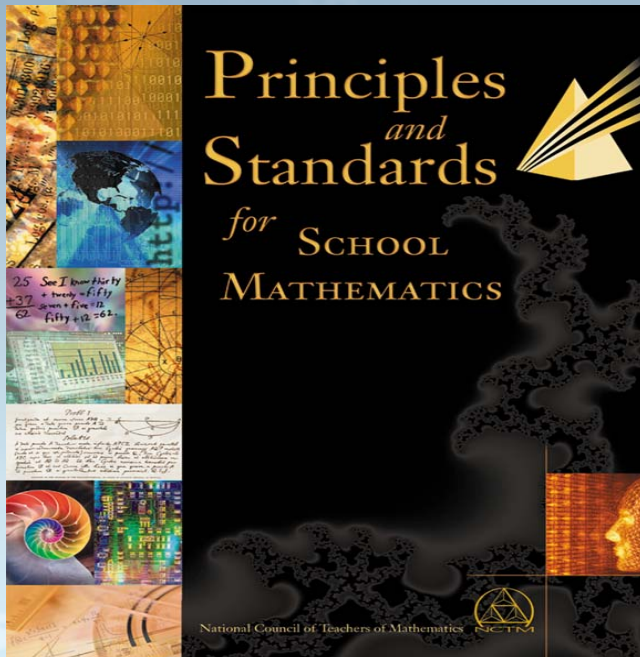
NCTM Curriculum Principle

- A curriculum is more than a collection of activities: it must be
  - coherent
  - focused on important mathematics
  - well articulated across the grades

Principles and Standards for School Mathematics, page 14

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NCTM Curriculum Principle

"…a well-articulated curriculum gives teachers guidance regarding important ideas or major themes, which receive special attention at different points in time. It also gives guidance about the depth of study warranted at particular times and when closure is expected for particular skills or concepts."

Principles and Standards, p. 16

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What Are Curriculum Focal Points?

- Important mathematical topics for each grade level, preK-8

- Cohesive clusters of related ideas, concepts, skills, and procedures that form the foundation for higher-level mathematics

What Are Curriculum Focal Points?

- More than a single objective, standard, expectation, or indicator

- Not discrete topics for teachers to present and check off as mastered by students

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Curriculum Focal Points and Connections for Grade 4

The set of three curriculum focal points and related connections for mathematics in grade 4 follow. These topics are the recommended content emphases for this grade level. It is essential that these focal points be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

Grade 4 Curriculum Focal Points	Connections to the Focal Points
***Number and Operations* and *Algebra*: Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication** Students use understandings of multiplication to develop quick recall of the basic multiplication facts and related division facts. They apply their understanding of models for multiplication (i.e., equal-sized groups, arrays, area models, equal intervals on the number line), place value, and properties of operations (in particular, the distributive property) as they develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers. They select appropriate methods and apply them accurately to estimate products or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems.	***Algebra:*** Students continue identifying, describing, and extending numeric patterns involving all operations and nonnumeric growing or repeating patterns. Through these experiences, they develop an understanding of the use of a rule to describe a sequence of numbers or objects. ***Geometry:*** Students extend their understanding of properties of two-dimensional shapes as they find the areas of polygons. They build on their earlier work with symmetry and congruence in grade 3 to encompass transformations, including those that produce line and rotational symmetry. By using transformations to design and analyze simple tilings and tessellations, students deepen their understanding of two-dimensional space.
***Number and Operations:* Developing an understanding of decimals, including the connections between fractions and decimals** Students understand decimal notation as an extension of the base-ten system of writing whole numbers that is useful for representing more numbers, including numbers between 0 and 1, between 1 and 2, and so on. Students relate their understanding of fractions to reading and writing decimals that are greater than or less than 1, identifying equivalent decimals, comparing and ordering decimals, and estimating decimal or fractional amounts in problem solving. They connect equivalent fractions and decimals by comparing models to symbols and locating equivalent symbols on the number line.	***Measurement:*** As part of understanding two-dimensional shapes, students measure and classify angles. ***Data Analysis:*** Students continue to use tools from grade 3, solving problems by making frequency tables, bar graphs, picture graphs, and line plots. They apply their understanding of place value to develop and use stem-and-leaf plots.
***Measurement:* Developing an understanding of area and determining the areas of two-dimensional shapes** Students recognize area as an attribute of two-dimensional regions. They learn that they can quantify area by finding the total number of same-sized units of area that cover the shape without gaps or overlaps. They understand that a square that is 1 unit on a side is the standard unit for measuring area. They select appropriate units, strategies (e.g., decomposing shapes), and tools for solving problems that involve estimating or measuring area. Students connect area measure to the area model that they have used to represent multiplication, and they use this connection to justify the formula for the area of a rectangle.	***Number and Operations:*** Building on their work in grade 3, students extend their understanding of place value and ways of representing numbers to 100,000 in various contexts. They use estimation in determining the relative sizes of amounts or distances. Students develop understandings of strategies for multidigit division by using models that represent division as the inverse of multiplication, as partitioning, or as successive subtraction. By working with decimals, students extend their ability to recognize equivalent fractions. Students' earlier work in grade 3 with models of fractions and multiplication and division facts supports their understanding of techniques for generating equivalent fractions and simplifying fractions.

Curriculum Focal Points

- Three per grade level, preK-8
- Often represent multiple content strands
- Describe the majority of instruction for a specific grade level
- Taken together across grade levels, provide the major components of a mathematically sound, coherent and cohesive preK-8 curriculum

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Connections to the Curriculum Focal Points

- Provide meaningful contexts for the focal points

- Identify connections between strands and across grade levels

- Round out a well-balanced curriculum

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How?

Curriculum Focal Points and State and District Leaders

- As a framework for future development of mathematics curriculum
- To identify grade-level targets

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Curriculum Focal Points and Teachers

- To design instruction around the question, "What are the most important ideas at my grade level?"

- To provide information about how ideas at one grade level fit with the important ideas in previous and following grades

- To prioritize uses of activities, assessments and other published materials

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Curriculum Focal Points and Publishers

As an example for guiding the next generation of instructional materials and related assessments

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Curriculum Focal Points and Teacher Educators

To organize preservice and inservice education for developing teachers' knowledge of critical mathematics understandings across the grades

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Who did this?

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Participation

- Writing group
  - Mathematicians
  - Mathematics educators
  - Teachers
- Outside reviewers
  - Mathematicians and mathematics educators
  - Teachers and supervisors
  - Policymakers

And then….

Curriculum Focal Points: What's New

- Priorities - focus

- Grade-by-grade descriptions

- Descriptive clusters of content

- More clarification

- Connections

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Curriculum Focal Points
What's Not New

- Alignment with *Principles and Standards for School Mathematics*, particularly the Curriculum Principle

- Well-balanced curriculum

- Strong attention to number and operations

- Commitment to problem solving, processes and content

- Understanding math, doing math, using math

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Questions…

- Can curriculum/standards designed around a few key ideas structure a comprehensive program?

- Can assessments focus on priorities and problem solving?

- How might textbooks/materials look different if structured around focal points?

- How can state/federal policies best support rich, deep appropriate mathematics for every student?

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The Goal: Curriculum Focal Points and Improved Mathematics Education

- Guidance for schools and states in the design of curricula and assessment that target the most important topics

- Focus for teachers that gives sufficient time for students to understand concepts and develop and apply skills necessary for future mathematics

- Clear direction for students and parents on the importance of deep understanding of particular topics at each grade level

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Your Questions?

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