

Mathematics Concepts & Applications (M-CAP)

Content Validity

Since the late 1980s, the National Council of Teachers of Mathematics (NCTM) has shaped the national perception regarding what is important for students to learn in mathematics by developing standards designed to ensure that students have the ability to use mathematics to solve real-life problems. First published in 1989 and revised in 2000, the NCTM *Principles and Standards for School Mathematics* set the stage for a continuous discussion among educators regarding *what* should be taught in mathematics and *when* it should be taught. In its 2006 publication, *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence*, the NCTM provided further clarity regarding mathematics expectations, as shown in the excerpt in Table 17.

Table 17
NCTM Curriculum Focal Points, by Grade

Grade	M-CAP	Focal point
2	X	Number and Operations: Base Ten, Place Value
		Number and Operations and Algebra: Basic Facts
	X	Measurement: Linear Measurement and Length
3		Number and Operations and Algebra: Understanding of Facts
	X	Number and Operations: Fractions
	X	Geometry: Two-Dimensional Shapes
4		Number and Operations and Algebra: Facts and Fluency with Whole Numbers
	X	Number and Operations: Decimals, Fractions and Decimals
	X	Measurement: Two-Dimensional Shapes
5	X	Number and Operations and Algebra: Fluency with Whole Numbers
	X	Number and Operations: Decimals, Fractions and Decimals
	X	Geometry and Measurement: Three-Dimensional Shapes
6		Number and Operations: Fluency with Multiplication/Division of Fractions and Decimals
	X	Number and Operations: Ratios and Rate
	X	Algebra: Expressions and Equations
7		Number and Operations and Algebra and Geometry: Proportionality and Similarity
	X	Measurement and Geometry and Algebra
	X	Number and Operations and Algebra: Rational Numbers and Linear Equations
8	X	Algebra: Linear Equations
	X	Geometry and Measurement: Space, Figures, Angles
	X	Data Analysis and Number and Operations and Algebra: Data Sets

According to the National Research Council (NRC) report *Adding It Up* (Mathematics Learning Study Committee & National Research Council, 2001 p. 5), an understanding of number concepts and operations—what the authors term *mathematics proficiencies*—is the most crucial of the domains that make up the K through 8 curriculum. The authors state:

“Mathematical proficiency, as we see it, has five strands:

- conceptual understanding—comprehension of mathematical concepts, operations, and relations
- procedural fluency—skill in carrying out procedures flexibly, accurately, efficiently, and appropriately
- strategic competence—ability to formulate, represent, and solve mathematical problems
- adaptive reasoning—capacity for logical thought, reflection, explanation, and justification
- productive disposition—habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy

The most important observation we make about these five strands is that they are interwoven and interdependent.”

The Mathematics Concepts & Applications (M–CAP) probes were designed with this in mind, while also incorporating the mathematical domains identified by the NCTM 2006 focal points. Furthermore, M–CAP was designed to also reflect the NRC’s recommendations regarding instruction, with a focus on ensuring students’ problem-solving, logical reasoning, and application of analytical skills to problems (Mathematics Learning Study Committee & National Research Council, 2001).

Table 18 describes the domains measured by M–CAP. The content blueprint of the *Stanford Achievement Test, Tenth Edition* (SAT10; Harcourt Educational Measurement, 2002) was used as a guideline for the proportion of items from each domain at each grade level.

Table 18
Domains Measured by M–CAP, by Grade

Domain	Grade						
	2	3	4	5	6	7	8
Number Sense	√	√	√	√	√	√	√
Operations	√	√	√	√	√	√	√
Patterns & Relationships	√	√	√	√	√	√	√
Measurement	√	√	√	√	√	√	√
Geometry	√	√	√	√	√	√	√
Data & Probability	√	√	√	√			
Algebra				√	√	√	√
Probability					√	√	√
Data & Statistics					√	√	√