HELPING TEACHERS BUILD MATHEMATICS CONNECTIONS AND PROBLEM-SOLVING SKILLS FOR EVERY STUDENT
NUMBERS complements any math curriculum and provides teachers with the skills to maximize instruction. These on-site, highly engaging, topic-based modules are founded on proven math instruction research. Each module was developed by national mathematics experts Dr. John Woodward, Dr. Michele Douglass, and Mary Stroh to present the flow of big ideas across grade levels.

### NUMBERS GRADE BANDS

<table>
<thead>
<tr>
<th>Grade Band</th>
<th>Number Sense (K–5)</th>
<th>Geometry and Measurement (K–5)</th>
<th>Fractions and Decimals (3–6)</th>
<th>Ratios and Proportions (6–8)</th>
<th>Algebraic Thinking (6–8)</th>
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### NUMBER SENSE (K–5)

A sense of numbers begins shortly after birth. This module begins with a review of important preschool developmental milestones learning about numbers and concludes with division and the concept of remainders. The major strands are:

- Number meaning—focus on counting strategies
- Number relationships—spatial patterns, number combinations, place value
- Operations on numbers—fact fluency, estimation, traditional and alternative algorithms
- Problem solving—type and structure of problems

### GEOMETRY AND MEASUREMENT (K–5)

At times, measurement and geometry clearly overlap. At others, they call for separate skills such as proportionality when converting inches to feet and visualizing congruent parts. The major strands are:

- Visualizing and reasoning about shapes—classifying and sorting shapes, partitioning shapes into equal shares, composition and decomposition of shapes, recognizing symmetry, classifying two-dimensional figures
- Measuring dimensions and angles—ordering objects by length, using appropriate tools, unit conversion, a dynamic understanding of area and perimeter, volume, angle measurement

### FRAC TIONS AND DECIMALS (3–6)

Developing competence in fractions and decimals involves a number of concepts that precede operations on these numbers. The major strands are:

- Fraction meaning—naming and representing fractions, equal shares, fractions as division, equivalence, magnitude
- Operations on fractions—conceptual foundations for each operation
- Decimal meaning—link to fractions, base ten, magnitude
- Operations on decimals—conceptual foundation for each operation, number sense

### RATIOS AND PROPORTIONS (6–8)

Ratios are a significant shift for students because of the relationship between quantities. They can be part-to-part or part-to-whole relationships. This module tackles misconceptions that students exhibit as they move into ratios and proportional thinking. The major strands are:

- Complexity of proportional thinking—the importance of multiplicative thinking, definitions of ratios and proportion
- Problem solving and visual representations—models (tables, double number lines, tape diagrams), research-based problem-solving strategies
- Connections to other middle school domains—geometry, statistics, algebra

### ALGEBRAIC THINKING (6–8)

Traditional instruction focuses almost exclusively on teaching students procedures. This module presents a rich picture of algebraic thinking, connecting algebra to math in earlier grades. The major strands are:

- Making generalizations—finding the algebra in arithmetic, making inductions from patterns, determining the truth value of math statements
- Rules, properties, and procedures—a conceptual understanding of integers and operations on integers, visual representations of expressions and equations
- Problem solving—making sense of functions, research-based approaches for algebraic problem solving

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What Teachers Learn

- How to help students develop and apply conceptual knowledge
- How to foster meaningful classroom discussions
- How to incorporate more problem-solving, including high-level tasks
- How to become better consumers of classroom instructional materials and use them more effectively

Flexible Training Delivery

NUMBERS provides maximum flexibility for any school system through on-site offerings that can be combined to create a customized solution.

On-site Professional Development

- Two days per module
- Nationally certified trainers
- Printed training material

In-Classroom Coaching

- Integrate NUMBERS strategies into any math curriculum
- Incorporate NUMBERS strategies into student instruction

Ongoing Implementation Support

- Long-term collaboration
- Support for Professional Learning Communities
- Planning tools
- Assessment tools

NUMBERS provides professional development and support related to the instructional planning, assessment, and differentiation specific to rigorous state and national math standards for grades K–8.

NUMBERS Authors

John Woodward, Ph.D., is a distinguished professor and dean in the School of Education at the University of Puget Sound. He has written more than 80 chapters and journal articles published in the United States and internationally. In addition to TransMath—an intervention curriculum for low-achieving middle school math students—he has coauthored four technology-based instructional programs. He has acted as the principal or coprincipal investigator for a number of significant research grants from the U.S. Department of Education. He taught for five years in Alaska, and he began his academic career codirecting a nonprofit research institute that focused on bilingual education, instructional interventions, technology-based instruction in math and science, and models for professional development. Most recently, he was the chair of the Institute of Education Science’s WWC Practice Guide titled Improving Mathematical Problem Solving in Grades 4 through 8.

Michele Douglass, Ph.D., is the president of MD School Solutions, Inc., a company that contracts with school districts on content and pedagogy with teachers and leaders. She holds her doctorate in curriculum and instruction. Her experience ranges from math instructor to director of curriculum and instruction at Educational Testing Services. She has authored several math, professional development, and technology programs. She consults in public schools on a regular basis.

Mary Stroh, M.S., is coauthor of TransMath. She has a Bachelor of Science from Central Michigan University in computer science, with a minor in mathematics. She began her research career as a systems engineer for Electronic Data Systems (EDS). Beginning in the late 1990s, she was a research assistant on federally funded intervention projects in mathematics for students with disabilities, and project coordinator and curriculum developer on two federally funded research grants from the U.S. Department of Education, Office of Special Education Programs.
PROFESSIONAL DEVELOPMENT TO MEET TODAY’S MATH STANDARDS

NUMBERS is …

• Hands-on, interactive professional development for teachers of mathematics in elementary and middle schools

• A series of 5 modules that address the key mathematical strands or domains of state standards in Grades K–8

• Curriculum independent and provides participants with the big ideas that build, progress and deepen across grade levels

Visit www.voyagersopris.com/numbers to get complimentary NUMBERS module samples and hear from the authors on key aspects of meaningful math instruction.