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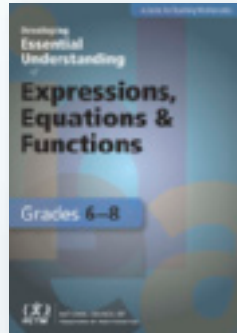
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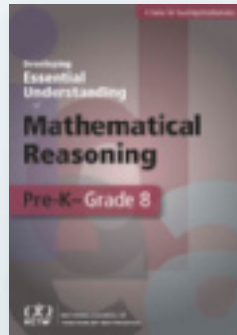


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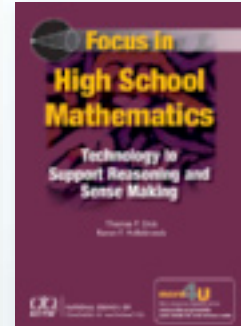
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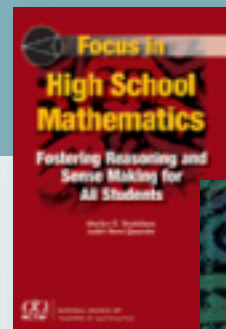


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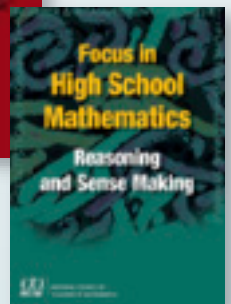
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NATIONAL COUNCIL OF
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by way of introduction

fostering mathematical reasoning

The teaching and learning of mathematics involves far more than memorizing procedures and applying algorithms. Problem solving, conjecturing, constructing and critiquing arguments, and communicating and representing mathematical ideas are at the heart of what we are trying to achieve in the classroom. NCTM recognizes the importance of helping teachers create learning environments that are conducive to transforming their students into learners who reason with and use mathematics. The five Process Standards in NCTM's *Principles and Standards for School Mathematics* (NCTM 2000) emphasize the importance of mathematical reasoning. "People who reason and think analytically tend to note patterns, structure, or regularities in both real-world situations and symbolic objects; they ask if those patterns are accidental or if they occur for a reason; and they conjecture and prove" (p. 56). *Principles and Standards* goes on to state that "Reasoning mathematically is a habit of mind, and like all habits, it must be developed through consistent use in many contexts" (p. 56).

NCTM has made mathematical reasoning a key component of both the *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics* (2006) and the Focus in High School Mathematics initiative. In fact, *Focus in High School Mathematics: Reasoning and Sense Making* (2009) emphasizes

mathematical reasoning and provides a detailed list of reasoning habits and suggestions of how to embed reasoning opportunities into everyday classes. Additionally, the *Common Core State Standards for Mathematics* (CCSSI 2010) begins with a set of Mathematical Practices that iterate the concepts of mathematical reasoning. The first three statements in the Common Core Math Standards explicitly emphasize reasoning and sense making:

- (a) Make sense of problems and persevere in solving them,
- (b) Reason abstractly and quantitatively, and
- (c) Construct viable arguments and critique the reasoning of others. (pp. 6–7)

The remaining five practices also require that students model with mathematics, use appropriate tools strategically, attend to precision, look for and make use of structure, and look for and express regularity in repeated reasoning (pp. 7–8). Given the importance of reasoning and sense making, the Editorial Panel of *Mathematics Teaching in the Middle School* is pleased to have chosen Fostering Mathematical Reasoning as the Focus Issue topic for this volume. The articles in this issue cover a spectrum of ideas, including teaching practices and classroom discourse that support mathematical

reasoning, use of manipulatives and relevant contexts to foster mathematical reasoning, and professional development that describes creating a classroom that emphasizes reasoning and sense making.

We hope that these articles inspire you to think deeply about the avenues and challenges in fostering mathematical reasoning, reflect on your teaching, and incorporate strategies that can enhance your students' capacity to reason mathematically.

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By Kien Lim and Fred Dillon
MTMS Editorial Panel
Focus Issue Editors