

Powerful Problem Solving: Activities for Sense Making with the Mathematical Practices

By Max Ray-Riek

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How can we break the cycle of frustrated students who "drop out of math" because the procedures just don't make sense to them? Or who memorize the procedures for the test but don't really understand the mathematics? Max Ray-Riek and his colleagues at the Math Forum @ Drexel University say "problem solved," by offering their collective wisdom about how students become proficient problem solvers, through the lens of the CCSS for Mathematical Practices. They unpack the process of problem solving in fresh new ways and turn the Practices into activities that teachers can use to foster habits of mind required by the Common Core:

- communicating ideas and listening to the reflections of others
- estimating and reasoning to see the "big picture" of a problem
- organizing information to promote problem solving
- using modeling and representations to visualize abstract concepts
- reflecting on, revising, justifying, and extending the work.

Powerful Problem Solving shows what's possible when students become active doers rather than passive consumers of mathematics. Max argues that the process of sense-making truly begins when we create questioning, curious classrooms full of students' own thoughts and ideas. By asking "What do you notice? What do you wonder?" we give students opportunities to see problems in big-picture ways, and discover multiple strategies for tackling a problem. Self-confidence, reflective skills, and engagement soar, and students discover that the goal is not to be "over and done," but to realize the many different ways to approach problems.

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Editorial Review

Review
Max Ray and his Math Forum colleagues have crafted a powerful guide to bringing the Standards for Mathematics Practice to life in our classrooms. Packed with real classroom experiences and easy-to-adopt activities, this book will help every teacher of mathematics overcome the instructional obstacles we face when trying to engage students in problem solving, reasoning and communication. --Steven Leinwand, American Institutes for Research and author of Accessible Mathematics

Powerful Problem Solving Activities draws attention to a greater understanding of how to integrate the Standards for Mathematical Practice into daily teaching to ensure that students develop critical thinking and problem solving skills. Helpful features in this book include learning through listening, noticing and wondering, seeing the big picture, engaging student s number sense through guessing, looking for structure, abstracting and modeling. This book is every teacher s roadmap for the development of mathematically proficient problem solvers. Teachers who read and spend time with this book will strengthen their own problem solving abilities and content knowledge and find confidence in their ability to think and reason. --Suzanne Mitchell, past president, NCTM

About the Author
Max Ray-Riek is a Professional Collaboration Facilitator at the Math Forum@ Drexel, a leading online resource for improving math learning, teaching, and communication. He is a former secondary mathematics teacher who presents at national conferences on fostering problem solving, communication, and valuing student thinking.

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