

# Foreword

*Number Talks* is a powerful, accessible, and informative journey through mathematical understanding and the pedagogical strategies that support its development. Broadly and consistently implementing the ideas and techniques presented by the authors can change lives—ours as teachers of mathematics and those of our students—as we work to build a deep and lasting sense of fractions, decimals, and percentages in our students.

Done right, there is something so engaging, so mathematically rich and yes, even so magical, about a number talk. Pose a straightforward exercise or simple word problem, give students time to solve it mentally, and then open the floodgates of thinking and reasoning with little more than asking, “How did you get your answer?” “Who did it differently?” and “How are our approaches similar and different?”

As authors Sherry Parrish and Ann Dominick remind us in Chapter 1, we all share a common goal when it comes to mathematics: We want our students to “become mathematically proficient, reason mathematically, and compute with accuracy, flexibility, and efficiency.” It’s one thing to state such a mom-and-apple-pie goal. It’s quite another to propose and describe practical and powerful strategies for meeting this goal. However, that is exactly why this resource is so helpful. *Number Talks* models how the techniques of conducting mathematical number talks and number strings enable students to grapple with number relationships, analyze their justifications and explanations, and communicate and solidify these critical understandings.

Parrish’s first book, *Number Talks: Whole Number Computation*, popularized the very concept and approach of number talks with a primary focus on whole numbers in grades K–5. This second resource in

the series tackles the much more intricate realm of fractions, decimals, and percentages. It extends what students have hopefully experienced previously to these far more complex and often seriously confusing topics that build on whole number fluency and understanding to rational numbers.

Just consider how many fourth and fifth graders are taught, confused, and even mathematically damaged by the approach of remembering and regurgitating that the “one correct way” to add  $\frac{1}{2}$  and  $\frac{7}{8}$  is to mindlessly get a common denominator of 8, convert the  $\frac{1}{2}$  to  $\frac{4}{8}$ , and then add the numerators and “keep the denominator”—because “that’s the rule”—to get the correct answer of  $\frac{11}{8}$ . And based on years of test scores, this makes frighteningly little sense to hundreds of millions of students.

Now envision, as described on pages 23–24, this same class where, through the process of number talks, we see a decidedly different mindset about teaching mathematics in practice.

- One student argues that  $\frac{7}{8}$  is the same as  $\frac{1}{2} + \frac{3}{8}$  so  $\frac{1}{2} + \frac{7}{8}$  is the same as  $\frac{1}{2} + \frac{1}{2} + \frac{3}{8}$  or  $1 + \frac{3}{8}$  or  $1\frac{3}{8}$ .
- Another student proposes that you can rename  $\frac{1}{2}$  as  $\frac{4}{8}$  and that means that there is a total of  $\frac{11}{8}$ .
- A third student announces that, thinking of her ruler, she can decompose  $\frac{1}{2}$  into  $\frac{3}{8}$  and  $\frac{1}{8}$ , and since  $\frac{1}{8} + \frac{7}{8}$  is 1, the sum must be  $1\frac{3}{8}$ .

When each of these approaches is recorded and discussed in the manner so clearly modeled throughout this resource, we move from the limits of “remember and regurgitate” to the impact of a classroom dominated by “pause, reason, explain, and connect.”

What has always impressed me about both the simplicity and the power of number talks done well is how they help to shift our teaching mindsets from “our telling” to “their thinking.” What has dazzled me in dozens of classrooms is how effortlessly a number talk surfaces alternative approaches and multiple representations that, although raised by only a few students, inform the learning of the entire class. What has amazed me is how seamlessly a number talk raises big ideas like equivalents, place value, representations, the meaning of operations and properties of numbers—all essential and unifying ideas for all mathematics learning. And what has astounded me is how frequently a number talk

surfaces common misconceptions and common errors that can be resolved well before they grow into major impediments.

We often think that the mathematical practices of reasoning and problem solving require rich and complex problems. But then we discover that a sixth-grade classroom discussion launched by a number talk about  $17\frac{1}{4} - 9\frac{5}{8}$  can thoroughly engage students in constructing viable arguments and critiquing the reasoning of others—thereby operationalizing one of the key Common Core Standards for Mathematical Practice in a much more efficient and accessible manner.

As the reader sees over and over again in the diverse examples that Parrish and Dominick present and describe in great detail, a number talk is the diametric opposite of teaching students the one right way to get the one right answer. Instead, an effective number talk celebrates different approaches and values different ways of thinking. As such, number talks place sense making exactly where it belongs—in the forefront of every mathematics lesson.

Helping students develop deep and lasting number sense around fractions, decimals, and percentages is *not* easy. Eliciting, justifying, and connecting alternative approaches—including some that are at first alien to us—is *not easy*. Initially implementing successful number talks with our students is *not* easy. But by taking some of the same small risks as teachers that we expect our students to take, together we can blend the critical goals of deeper number sense and computational fluency with the techniques of number talks to create far more effective learning experiences and much greater success for our students.

I sincerely hope that every reader of this book learns as much from it as I have and, starting today, is as motivated to transfer these ideas into daily classroom practice.

—*Steve Leinwand, American Institutes for Research*