



Preface

Maybe you were a math whiz in school, but you've been confounded by your third grader's math homework. Or maybe you struggled with math, and you want your child to have a better experience. Whatever your reason for buying this book, we wrote it for parents like you who want to support and participate in their children's math education with insight and intelligence. As parents you have a vested interest in your children's education. You want to provide them with every opportunity to be successful in the classroom and in life. You know that if a child is to thrive in our tech-driven global society, his or her ability to understand and use mathematics is more important than ever. You also realize that although your children are learning the same topics you did in school, they are often presented very differently. With the wealth of research reported over the last several decades, it is likely that there are many new ideas about teaching and learning mathematics that you are not aware of. Becoming better acquainted and more comfortable with these ideas and practices will help you help your children.

Mathematics is all around us, and your children experience it in and out of the classroom every day. When you help your child figure out how much more money he or she needs to buy a toy or trinket, you may not give it a second thought. But you may worry about how to best help your child be a successful math learner. You may wonder—

- ◆ what you can do to encourage your child as he or she does math homework;
- ◆ if you should show your child how to solve a problem;
- ◆ how your child thinks about and solves problems;
- ◆ if there are games, workbooks, or other resources that you should buy so your child can practice math skills; and
- ◆ how your children encounter mathematics in and out of the classroom.

In this guide, we talk about these and other concerns that you may have about your children's math education.

The information in this book is targeted to parents of children in kindergarten through the fifth grade. As we thought about what we wanted this guide to do—help provide parents a better sense of their children's mathematical worlds—we realized it would be too big a job to cover all the areas addressed in K–5 schoolrooms. For instance, we do not talk about topics in the elementary curriculum such as geometry (e.g., learning about shapes in kindergarten, classifying shapes in fourth grade), statistics (e.g., making survey questions, collecting and analyzing survey data in third or fourth grade), and so on. Instead, we focus on number sense and the four operations because it is usually these topics that first alert parents to just how differently math is now taught—and sometimes alarm them. They are also among the foundational math subject matter that children learn, and on which they continue to build as they study more advanced concepts in middle and high school.

The central content of the book is organized into an introduction and eight chapters:

Chapter 1: Understanding Today's Mathematics Classroom

Chapter 2: Mathematical Processes and Skills

Chapter 3: Number Sense

Chapter 4: Working with Whole Number Operations

Chapter 5: Understanding Fractions and Decimals

Chapter 6: Working with Fractions

Chapter 7: Mathematics at Home

Chapter 8: Connections to Middle School and Beyond

The introduction sets up the framework for the content of this book—our four guiding principles. We use these principles to underpin our discussions of various mathematical topics, and we make connections between them and the ideas we address in the chapters. You can use the principles as a way to better understand your children's mathematical worlds. As you get started, we suggest reading and making sense of them one at a time. These principles will also help you nurture the creativity and reasoning that children naturally exhibit with mathematics. While all four principles play a part in some chapters, individual chapters focus on particular ones. The chart on the following page indicates the target principles for each chapter.

Chapter 1 provides information about teaching and learning mathematics in the 21st-century classroom. We address what students are expected to do to be successful in math class, and discuss how the teacher supports student learning. Some of the strategies that the teacher uses will be familiar while others will be new to you. Other topics, such as assessment and curricular materials, are also highlighted.

Principles	Chapter 1	Chapter 2	Chapter 3	Chapter 4	Chapter 5	Chapter 6	Chapter 7	Chapter 8
Children do impressive mathematics. It is essential to understand their work to grasp how children think about and approach mathematics.		✓	✓	✓	✓	✓	✓	✓
Parents must be aware of the expectations for students in today's mathematics classroom.	✓	✓	✓	✓	✓	✓		
The mathematics classroom children experience today operates very differently from the one their parents remember.	✓	✓				✓	✓	
Understanding mathematics requires children to make connections among mathematical ideas.		✓	✓	✓	✓	✓		✓

In chapter 2, the math processes and skills that children develop during elementary school are examined. Several processes get particular attention: solving problems, explaining and justifying solutions, and using models (i.e., representing mathematical ideas with pictures or diagrams). We also focus on two important skills that children develop: 1) knowing basic facts for addition, subtraction, multiplication, and division, such as $7 - 4 = 3$ or $4 \times 3 = 12$, and 2) knowing how to efficiently compute (e.g., adding two-digit numbers). Researchers and educators consider these processes and skills to be crucial to children's development of mathematical understanding. If children are to make sense of the mathematics they are learning, they must become proficient in using these processes and skills.

In this chapter we also recognize that mastery of skills is a key factor in a child's overall success. In line with the positions taken by professional organizations and the research community, we believe that skills and processes go hand in hand, so as subjects related to mastering skills are discussed, we keep in mind the vital role that procedures and routines play in developing skills and methods that become more automatic over time. "Practice makes perfect" is as true for math as it is for any other activity, and we talk about its role in helping children remember what they already know and understand.

Chapter 3 addresses a range of topics, from early number ideas and the counting strategies children use to chunking methods (e.g., $15 + 13 = 15 + 5 + 8 = 20 + 8 = 28$) that are related to number sense and other topics covered in the K-5 mathematics curriculum. We also turn our attention to our Hindu-Arabic numeration system because understanding it is essential for students grappling with the concepts surrounding place value. And we discuss how learning basic arithmetic lays the foundation for studying algebra in high school. It may seem out of place to talk about algebra in a book focusing on elementary mathematics, but our point of view is that as children solve problems and explain their thinking, they begin to see patterns and develop more general thoughts

about numbers and the operations that can lead to opportunities to explore basic concepts related to algebra.

Chapter 4 highlights how children make sense of the four whole number operations: addition, subtraction, multiplication, and division. Children's work samples are used to illustrate the ways they reason about and develop more efficient methods. We also use work samples to discuss the mathematics that children wrestle with as they make sense of and solve problems.

Children's beginning study of fractions and decimals and their use of intuitive ideas as they explore them are the focus of chapter 5. These ideas include the use of pictures or diagrams to depict these new numbers and how children make sense of them. We also address how important it is for children to develop fraction and decimal number sense.

Adding, subtracting, multiplying, and dividing with fractions are the core topics of chapter 6. Many of the ideas about whole numbers that were previously discussed are extended to fractions as we explore how children think about and reason about these four operations. We should note that not all students formally study division of fractions by the fifth grade, but the topic is covered because children begin to make sense of division of fractions well before they are officially introduced to it. Decimals and how students can work sensibly to solve problems with them are also touched upon.

Math can be fun—really. In addition to providing suggestions for talking with your children about math and helping them with homework, chapter 7 takes a look at how you can be a smart consumer of educational materials, including games and online resources.

The study of mathematics is all about making connections, and so chapter 8 addresses how the ideas discussed in previous chapters extend to students in middle school and high school. To illustrate this point, we examine a problem that children may initially work on in first grade and then follow its track through different grade levels.

Each chapter includes several features that give more information about the topics under discussion:

Classroom Vignettes, usually at the beginning of a chapter, focus on children's mathematical work in the classroom. We use these anecdotes to further illustrate some of the key ideas addressed in a chapter.

Taking a Closer Look highlights the different mathematical ideas behind children's work. We also briefly discuss how the children's methods are related to the topics discussed in the chapter.

Reader's Challenge is a feature that pauses the narrative so the reader can think about key concepts and practices or solve a math problem. Later on in the text, we discuss these questions and provide answers to the problems.

Do You Know? offers additional information about an education concept or issue with which parents may be less familiar.

What's the Math? spotlights some of the formal mathematical ideas that are addressed in the text. We discuss how children's informal methods and ways of reasoning are related to the concepts that mathematicians and others in the scientific community use.

Things to Remember summarizes some of the key ideas that are discussed in a chapter.

Things to Do provides suggestions for how parents might use the information in the chapter to support their child's math journey.

Resources that we have found helpful are listed at the end of each chapter. These resources are not the only ones available. The intent is to provide a selective list of materials for parents to use, either to learn more about their children's mathematical worlds or to use as activities.

The topics in chapters 3, 4, 5, and 6 are often presented in the same order in which they appear in K–5 curriculum. If you are interested in a particular topic, you can read selected chapters or sections without taking away from the overall intent of the book.

Last but not least, we have included a glossary of math terms at the back of the book for easy reference. Some, such as *model*, *situation*, and *argument*, will be familiar because they are commonly used, but here they are defined within a mathematics context. Other entries may stir a vague memory from your own school days, while a few may be totally new to you. For the most part, this is the vocabulary your children are learning and using every day in math class.

Our hope is that *It's Elementary* gives you the resources you need to effectively and happily play a part in your children's math education in the classroom and at home.