

# PREFACE

---

## ORGANIZATION OF THE BOOK

Although proportional thinking is often thought of as a middle school topic, its roots start in the early elementary years. Bringing attention to important fundamental ideas in proportional thinking in the earlier grades will benefit students in developing essential proportional thinking skills.

This resource is organized by grade level around the Common Core State Standards for Mathematics related to proportional thinking and those that can be related to proportional thinking through the use of appropriate questioning. The grades covered in this resource begin with Kindergarten, where exposure to proportional thinking is more implicit, and end with Grade 8, where the focus on proportional thinking is much more explicit.

In Grades K–2, prior to the formal introduction of multiplication, important ideas related to proportional thinking can be brought up in a number of strands. These ideas are addressed in this resource by highlighting approaches to proportional thinking that can be taken when dealing with particular standards for those grades, as well as by suggesting some good questions to ask to bring the ideas out. For Grades 3–8, where specific standards directly target multiplicative thinking and proportional thinking, portions of those standards as well as others where proportional thinking can be addressed are presented, again followed by a delineation of important underlying ideas and good questions to ask to bring those ideas out.

Underlying ideas might provide the following:

- Background on the mathematics of the standard related to proportionality
- Suggestions for appropriate representations, including manipulatives, for those specific mathematical ideas
- Suggestions for explaining ideas to students, or
- Cautions about misconceptions or situations to avoid

Following the discussion of the sets of underlying ideas are groups of questions that can be used for either classroom instruction, practice, or assessment relating to the ideas presented. In addition, specific reference is often made to the Common Core State Standards for Mathematical Practice.

## For Whom Is This Book Useful and Why?

This resource is designed to support math teachers, Kindergarten–Grade 8, as they strive to help students become more proficient and more comfortable in working with situations involving multiplicative thinking and proportionality. It is also intended as a resource for math coaches as they assist teachers in their transition to teaching mathematics within the more demanding framework of the Common Core State Standards. These new standards challenge all of us to help students become mathematical *thinkers*, not just mathematical “doers.” The goal is to develop students who can reason and represent mathematical situations in multiple ways and can explain their reasoning to others. I also hope that this book will be helpful to preservice teachers and their instructors as the preservice teachers prepare themselves to understand and teach math with a deep level of understanding.

## Considering the Bigger Picture

While I would hope that all users would read the entire book, I particularly suggest this approach for math coaches and preservice teachers. For grade-level or grade-band teachers, I suggest reading the Introduction and the grade-level sections that apply most directly for their particular groups of students, but also becoming acquainted with the mathematics related to proportional thinking taught in grades directly below and above. As we all know, individual students in any classroom are at different levels of understanding, and it is helpful to be aware of missing prerequisite knowledge as well as directions for moving forward in order to differentiate instruction for them. Knowledge of the progressions preceding specific concepts can also be helpful in diagnosing and resolving problems students may be encountering.

Lastly, I hope that reading this book adds to a broader conception of what proportional thinking is all about and its utility.

## ACKNOWLEDGMENTS

During the year prior to writing this resource, I had the opportunity to interact with teachers in many school districts as they worked to enhance their own and their students’ understanding of and comfort with proportional reasoning. Many of the ideas in this resource were tried out in their classrooms.

I appreciate the feedback I received from these teachers and their willingness to grant me access to their and their students’ thinking.