

CONTEXTS FOR LEARNING

SERIES OVERVIEW



The *Contexts for Learning Mathematics* series is organized around 18 core units. Each unit comprises a two-week (10 days) sequence of investigations, games, routines, and minilessons and is designed to support the development of key topics such as place value, subtraction, multiplication and fractions. Each unit is developed around a rich context—realistic and fictional—that uses carefully chosen numbers to foster and support the development of specific strategies.

Investigations in **Number Sense, Addition, and Subtraction** (Grades K–3 / 8 Units)

- 1 In *Bunk Beds and Apple Boxes* children learn about compensation and equivalence within the context of a pajama party—where a babysitter is challenged to keep track of eight excitable girls who continually change places on their bunk bed—and also in a grocery store where a grocer arranges two kinds of apples in different-sized trays. The unit introduces the arithmetic rack, a calculating frame that provides a powerful model for exploring part-whole relations.
- 2 *Beads and Shoes, Making Twos* uses the context of walking hand in hand in two lines to explore doubles and even or odd numbers. As the unit progresses, a story about designing necklace patterns using only two colors of beads creates a context for exploring the relationship between doubles and skip-counting and invites students to work with groups as units.
- 3 *The Double-Decker Bus*, the story of a little girl’s efforts to count the number of passengers on fast-moving double-decker buses, introduces students to the benefits of using the five-structure to quickly calculate quantities. To support and extend this story, the arithmetic rack whose beads mirror the number and organization of seats on the buses provides a powerful model for solving addition and subtraction problems.
- 4 Based on a story about the hopelessly disorganized Masloppy family’s efforts to keep track of their things, *Organizing and Collecting* explores efficient ways to count and highlights place value patterns and the relationship between five- and ten-structures. As the unit progresses, children develop place value and addition strategies.
- 5 *Measuring for the Art Show* builds on children’s early addition and measurement strategies within the context of preparing labels for an art show. The focus of this unit is the development of the open number line model within the context of measurement. As the unit progresses, the number line is used as a model for double-digit addition strategies.
- 6 In *Trades, Jumps, and Stops*, the Masloppy family creates another context for learning about mathematics. The equitable distribution of funds from the family piggy bank to finance a trip to New York City introduces big ideas and strategies in algebra, including using substitution to examine for equivalence and using associative and commutative properties to make equivalent expressions. The movement of passengers at subway stops creates another context to explore net change and functions. The double number line is used as a model for understanding exchange and equivalence.
- 7 *Ages and Timelines* begins with the story of eight-year old Carlos’ visit with his great-grandfather. Carlos’ fascination with his great-grandfather’s beautiful silver hair, and the time it will take him to grow a similar mane, initiates a family-wide investigation into age differences. The context of age differences and the open number line model support the development of subtraction strategies.
- 8 Students revisit the Masloppy family in *The T-Shirt Factory* as Grandma Masloppy stumbles into a lucrative T-shirt business. This context and follow-up simulations highlight place value, regrouping, equivalence, and systematic exchange. As the unit progresses, standard addition and subtraction algorithms are explored, and the concept of place value is developed to four places.

Investigations in **Multiplication and Division**

(Grades 3–5 / 5 Units)

- 1 Using baker's trays, postage stamps, patio tiles, and other realistic contexts, *Groceries, Stamps, and Measuring Strips* introduces fundamental multiplication strategies. Carefully-crafted arrangements of real-world resources invite repeated addition, skip-counting, and doubling strategies as well as introducing the language of grouping. As the unit progresses, students make a set of measurement strips (for the multiplication tables) and use them to explore the relationships between the products.
- 2 In *The Big Dinner*, the context of preparing a turkey dinner highlights students' early multiplication strategies, and supports automatizing the facts, using the ratio table, and developing the distributive property with large numbers. Strings of related problems guide learners toward computational fluency with whole-number multiplication and build automaticity with multiplication facts by focusing on relationships.
- 3 A chocolatier's efforts to cope with the operational challenges of running a truffle shop (counting, pricing, and labeling assorted boxes of chocolates) in *Muffles' Truffles* introduces students to the open array as a model for multiplication and division. A series of investigations explores and applies place value—the multiplicative structure of our base-ten system and quotative division—and big ideas in multiplication, including the distributive, associative, and commutative properties.
- 4 The stocking of water and juice vending machines in *The Teachers' Lounge* introduces big ideas related to division. As students consider different ways to inventory the contents of each machine, they employ a repertoire of strategies including the use of the ten-times strategy, partial products and partial quotients, the associative property, and the distributive property of multiplication over addition—the basis for the long division algorithm.
- 5 The focus of *The Box Factory* is the deepening and extending of students' understanding of multiplication, specifically the associative and commutative properties and their use with computation, systematic factoring, and the extension of students' understanding of two-dimensional rectangular arrays to three-dimensional arrays within rectangular prisms. The concepts are explored against the context of a box factory where students design boxes to meet specific size and space requirements.

Investigations in **Fractions, Decimals, and Percents**

(Grades 4–6 / 5 Units)

- 1 The fair-sharing of submarine sandwiches on a school field trip provides the context for exploring big ideas related to fractions in *Field Trips and Fund-Raisers*. In attempting to settle arguments about the fair distribution of sandwiches, students explore the connection between division and fractions as well as ways to compare fractional amounts. As the unit progresses, students use the ratio table as a model and explore equivalent fractions.
- 2 *The California Frog-Jumping Contest* uses the context of the famous short story by Mark Twain—*The Celebrated Jumping Frog of Calaveras County*—to develop equivalence and its use in solving algebraic problems. This context leads to using the number line as a tool for solving problems with an unknown; the length of a frog jump. As the unit progresses, students investigate equivalent lengths of different-sized jumps and work with these equivalences flexibly to solve problems.
- 3 *Best Buys, Recipes, and Ratios* uses the context of comparison shopping to explore equivalence of fractions, proportional reasoning, and rates. Ratio tables are used to help students determine the cost of several different amounts of bird seed sold by weight. As the unit progresses, the double number line is used for computation as students investigate the readings on a truck's gas tank over the course of various trips.
- 4 In *The Mystery of the Meters*, five meter dials on the side of a house initiate a series of investigations that focus on decimals. Periodic reading and data collection eventually reveal that these are electric meters. Because students can see how the numbers expressed as decimals increase with time, the meter is a powerful tool for students to use to determine equivalents and to examine how decimals increase and are ordered.
- 5 Road race results and training data create a context in *Exploring Parks and Playgrounds* for exploring big ideas and strategies related to multiplication and division with fractions as well as the relationship between these operations. As the unit progresses, students multiply fractions by other fractions and equivalent forms of fractions—percentages and decimals—in the context of designing a playground. In this unit, double number line and array models are used as helpful tools.