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Introduction

Approaching Math Content— Today's Standards

The Common Core State Standards address several important goals in education:

- to prepare students for college and careers
- to develop critical-thinking and analytical skills students need for success
- to help teachers measure student progress and achievement throughout the year

The Common Core Mathematics Standards seek to provide teachers and students with focused mathematics instruction. The standards are designed to deepen students' understanding as they progress through grade levels and topics.

Mathematics is a subject in which concepts build in a progression. A strong foundation of basic concepts must be laid, beginning in the early grades. The Common Core State Standards recognize this learning sequence. Mathematical thinking is divided into several broad categories, referred to as “domains.” Elementary grades address the same general domains, with specific standards for student understanding and achievement within each domain. For grades 1–5, these domains include Operations & Algebraic Thinking, Number & Operations in Base Ten, Number & Operations—Fractions (begins in grade 3), Measurement & Data, and Geometry.

It is important for students to understand the role mathematics plays in everyday life. The Common Core Mathematics Standards encourage students to apply their mathematical knowledge to real-world problems and situations. Teachers, in turn, assess student understanding and mastery of concepts by asking them to explain their thinking and justify their answers. Word problems provide students with opportunities for the practical application of mathematical concepts.

This book presents word problems in a realistic setting. Students dig into the content of each “scenario” as they apply math concepts to solve multiple problems. Each unit is designed to encourage students to read for understanding, revisit content on a variety of levels, and use information as a tool for solving more complex problems.

Establishing Mathematical Practices

The Common Core Standards for Mathematical Practice (SMP) describe practices students can implement to help them engage with mathematical content. As your students work through the activities in this book, encourage them to develop these habits as they practice and develop problem-solving skills.

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

These practices help students understand core mathematical concepts so they can apply a variety of strategies for successful problem solving. As students learn underlying principles, they will be able to . . .

- consider similar problems.
- represent problems in ways that make sense.
- justify conclusions and explain their reasoning.
- apply mathematics to practical situations.
- use technology to work with mathematics.
- explain concepts to other students.
- consider a broad overview of a problem.
- deviate from a known procedure to use an appropriate shortcut.
- reason and explain why a mathematical statement is true.
- explain and apply appropriate mathematical rules.

Help your students and their families find success. Work with administrators, other teachers, and parents to plan and hold math-coaching nights for parents. The tips on page 6 may be helpful for parents as they work with students at home. Consider photocopying the page to send home in students' homework folders to aid with math assignments. Additionally, prepare a visual aid to help parents understand students' work in math. Share this aid with parents at back-to-school night or on other occasions when they visit the classroom.

How to Use This Book

This book contains several mathematical problem-solving units. Each unit gives students the opportunity to practice and develop one or more essential mathematical skills. Units are grouped by domains—although within a unit, more than one domain may be addressed. Within each domain, math concepts build on one another, forming a foundation for student learning and understanding. In addition to the Common Core Mathematics Standards covered in this book, the passages that accompany each unit meet one or more English Language Arts Standards as they provide practice reading appropriate literature and nonfiction text.

About the Units

Each unit is three pages in length. Depending on the needs of your students, you may wish to introduce units in small-group or whole-class settings using a guided-to-independent approach. Reading the passages and responding to activities in collaborative groups allows students to share and support their problem-solving results. As an alternative, students can work independently and compare responses with others. Whichever method you choose, the reading and math activities will provide students with the tools they need to build mathematical knowledge for today's more rigorous math standards.

Page 1

All units begin with a reading passage that presents a mathematical problem or situation. Engaging nonfiction and fiction passages are included in the book. Passages are age-level appropriate and fall within a range of 420 to 650 on the Lexile scale.

Each passage incorporates information to be used for solving practical math problems. They also allow students to experience a variety of genres and make meaningful connections between math and reading.

Students practice reading skills as they read for understanding, revisit text on a variety of levels, and use passage information as a tool for solving more complex problems.

Sidebars provide tips to help students think about how to do the math. In addition, they offer tools or strategies students can use throughout the problem-solving process.

Operations & Algebraic Thinking


NAME _____ DATE _____

The Mountain that Lost Its Top

Often when a volcano erupts, it is on an island or in another country. Mount St. Helens erupted in 1980. It is in Washington State. The mountain is 185 miles south of Seattle. It is 70 miles northeast of Portland.

Sensors recorded tremors two months before the eruption. The National Guard set up roadblocks. They asked people to leave their homes to stay safe. Many people left, but some stayed. A huge bulge on the north side kept growing for the next month.

On May 18, there was a huge eruption. It measured over 5 on the Richter scale. Ash blasted out at 650 miles per hour. The earthquake caused a huge avalanche. Ash, rocks, and glacial ice slid down the mountain at 100 miles per hour. It landed in the river below. As a result of the eruption, 57 people died. Twenty-seven of those people were never found.



After the landslide, there was a blast that went up in the air. The blast wiped out everything within 8 miles of the mountain at once. Within 20 miles, all the trees were knocked down. Trees in the surrounding area still stood, but they were dead. The total area destroyed by the blast was 230 square miles. Ash and gas went 12 miles into the air. This went on for 9 hours. The east wind blew that day. It carried ash from the eruption to places far away.

THINK ABOUT THE MATH

- Addition shows the total of two amounts put together.
- Subtraction shows what happens when we take an amount away from a set.
- There are an average of 30 days in a month.
- Use mental math for sums you have learned and no longer need models or pictures to show.
- Use a letter in place of an unknown number in an equation.
- Draw a picture to show what is happening in a problem.
- Use symbols $<$, $=$, and $>$ to compare two numbers.

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How to Use This Book (cont.)

About the Units (cont.)

Page 2

The second page of each unit introduces problem-solving tasks. Space is provided for students to draw pictures, work out their answers, write equations, show their work, and explain their thinking. Students are asked to use the unit passage to respond to reading content and investigate the text in order to find solutions to the problems on the page.

The questions require students to look back at the text for clues and information that relates to each question. They must then interpret this information in a way that helps them solve each task on the page. In doing so, students learn to support their responses with concrete evidence.

Operations & Algebraic Thinking

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Operations & Algebraic Thinking The Mountain that Lost Its Top

NAME _____ DATE _____

Problem Solving Directions: Use page 13 to answer these questions. First skim the paragraphs to find information that might help you solve the problem. Remember to show your thinking as you do the math!

- Which town is farther from Mount St. Helens, Portland or Seattle? _____
Write a statement to compare the distances.
_____ miles _____ miles
- Write an equation to show the unknown amount. Use place-value strategies to find the difference.

- How much farther away is it? _____
- How many days before the eruption did sensors record the first tremors? _____
- How many days did the bulge on the north side grow? _____
- How many people did they find who were killed by the eruption? Write an equation. Use place-value strategies to find the number of people who were not missing.

- Draw a picture to show how much damage was done around the mountain. Label your drawing.

What was the length of the distance that had trees knocked down but not everything wiped out? _____

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Page 3

The *Engage* option extends the mathematical situation with questions that allow students to look back at the reading passage and use critical-thinking skills.

The activities in this section strengthen students' comprehension skills by posing questions or situations for which further reflection of the text is required. Questions may be open-ended and require higher-level thinking skills and supported responses. Activities in this section focus on a combination of reading and math skills.

While students can respond independently to the activities on this page, you may wish to have them discuss their answers with a partner, in a small group, or with the entire class. This method can also provide closure to the unit.

The Mountain that Lost Its Top Operations & Algebraic Thinking

NAME _____ DATE _____

Engage Directions: Look back at the passage to review information about what happened during this eruption. Then, answer the questions below.

- Why did the National Guard ask people to leave their homes? _____
- How do we know the blast had a lot of force? _____
- In this passage, what is an avalanche? _____
What happened to the ash, rock, and ice from the mountain? _____
- Why did ash travel so far away from the mountain? _____
- Mount St. Helens went from 9,600 feet high to 8,300 feet high in a few seconds. How much height did the mountain lose? Think about hundreds, tens, and ones to find the amount of height the mountain lost.

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NAME _____

DATE _____

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Problem Solving

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Write a statement to compare the distances.

_____ miles _____ miles

Write an equation to show the unknown amount. Use place-value strategies to find the difference.

How much farther away is it? _____

- 2 How many days before the eruption did sensors record the first tremors? _____
How many days did the bulge on the north side grow? _____

- 3 How many people did they find who were killed by the eruption? Write an equation. Use place-value strategies to find the number of people who were not missing.

- 4 Draw a picture to show how much damage was done around the mountain. Label your drawing.

What was the length of the distance that had trees knocked down but not everything wiped out?

NAME _____

DATE _____

Engage

Directions: Look back at the passage to review information about what happened during this eruption. Then, answer the questions below.

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2 How do we know the blast had a lot of force? _____

3 In this passage, what is an avalanche? _____

What happened to the ash, rock, and ice from the mountain? _____

4 Why did ash travel so far away from the mountain? _____

5 Mount St. Helens went from 9,600 feet high to 8,300 feet high in a few seconds. How much height did the mountain lose? Think about hundreds, tens, and ones to find the amount of height the mountain lost.