Chapter 1

MULTI-DIGIT WHOLE NUMBERS

Across-Grades Progression

Looking Back	Looking Here	Looking Ahead
Grade 4 Chapter 1 **Section 1A Numbers to 1,000,000** • Place Value **Section 1B Compare and Order Numbers** • Compare and Order Numbers Within 1,000,000 • Number and Shape Patterns **Grade 4 Chapter 3** **Section 3D Multiply by Tens, Hundreds, and Thousands** • Multiply a number by multiples of 10, 100, and 1,000	**Grade 5 Chapter 1** **Section 1A Numbers to 10 Million** • Numbers to 10 Million and Place Value **Section 1B Multiply by Tens, Hundreds, and Thousands** • Multiply by Tens, Hundreds, and Thousands • Multiply by Powers of 10 **Section 1C Divide by Tens, Hundreds, and Thousands**	**Grade 6** **Exponential Notation and Prime Factorization** • Express a composite number as a product of its prime factors. • Find the common factors and and the greatest common factor of two whole numbers. • Find the common multiples and the least common multiple of two whole numbers. • Write and evaluate numerical expressions involving whole number exponents.

Across-Chapters STEAM Project Work

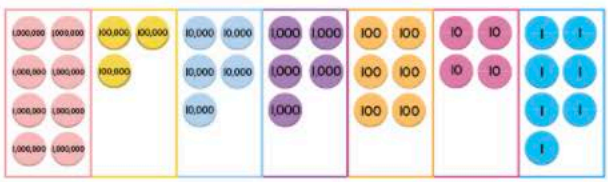
This project spans **Chapters 1** and **2**. Students are given an opportunity to make connections between science and mathematics as they learn the science behind myopia or amblyopia, the reasons for the rise in these conditions, how myopia or amblyopia affect children, and what can be done to prevent myopia or amblyopia. This task requires students to apply their knowledge of numbers to 10 million to find the estimated population with myopia or amblyopia and how many children are myopic or have amblyopia. In Chapter 1, students will work in small groups to choose one of the topics to research, then design a brochure to share prevention tips. In Chapter 2, students will think of a slogan for the brochure and make a "Secret Message Puzzle." To help their classmates solve the secret message, they will provide clues that will require them to solve questions involving multiplication and division of 3-digit by 2-digit numbers.

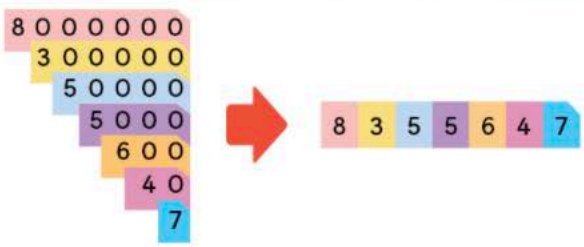
Chapter Overview

In this chapter, students' knowledge from Grade 4 of numbers to 1,000,000 is extended to understanding numbers to 10 million. Students will also learn to multiply and divide by tens, hundreds, thousands, and powers of 10.

Key Ideas

- Multi-digit numbers of up to 10 million can be expressed in standard, expanded, and word forms.





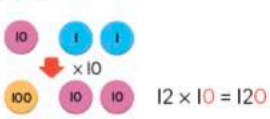
Standard form: 8,355,647
Expanded form: 8,000,000 + 300,000 + 50,000 + 5,000 + 600 + 40 + 7
Word form: eight million, three hundred fifty-five thousand, six hundred forty-seven

- The value of each place is 10 times the value of the place to its right and $\frac{1}{10}$ the value of the place to its left.

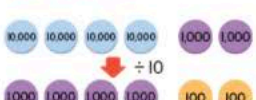
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	7	9	9	0	4	6

The value of the digit 9 in the ten thousands place is 10 times its value in the thousands place.

- Strategies based on place value can be generalized to multiply and divide numbers by tens, hundreds, thousands, and powers of 10.



$12 \times 10 = 120$

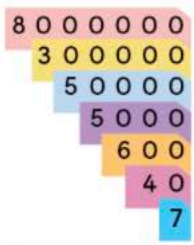


$42{,}000 \div 10 = 4{,}200$

Concrete-Pictorial-Abstract Progression

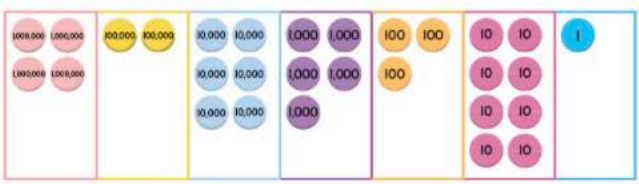
Throughout the chapter, students will have multiple experiences working with concrete materials such as place-value chips and place-value strips. The use of concrete materials provides hands-on opportunities for students to build and extend their understanding of numbers to 10 million.

Place-value chips



Place-value strips

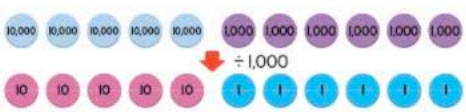
Pictorial representations are also used to help students visualize numbers to 10 million in various ways.



These place-value chips show the value of each digit in a 7-digit number.

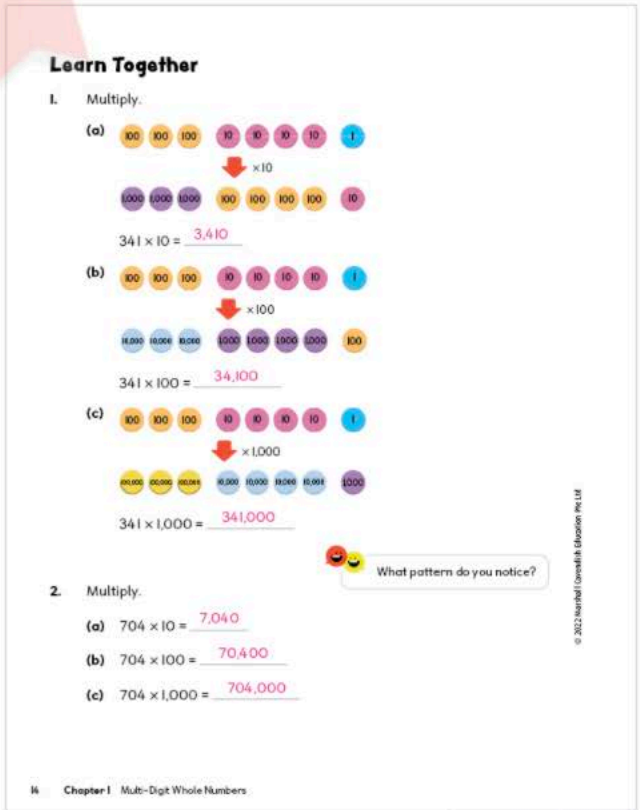
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
3	4	5	8	8	1	9

This place-value chart shows the digit in each place.



These place-value chips show division by 1,000.

After students have built their understanding through concrete and pictorial representations, they will move to the abstract stage where they apply the understanding of place-value concepts to generalize patterns in multiplying and dividing by tens, hundreds, thousands, and powers of ten.



Learn Together

1. Multiply.

(a)

341 × 10 = 3,410

(b)

341 × 100 = 34,100

(c)

341 × 1,000 = 341,000

What pattern do you notice?

2. Multiply.

(a) 704 × 10 = 7,040

(b) 704 × 100 = 70,400

(c) 704 × 1,000 = 704,000

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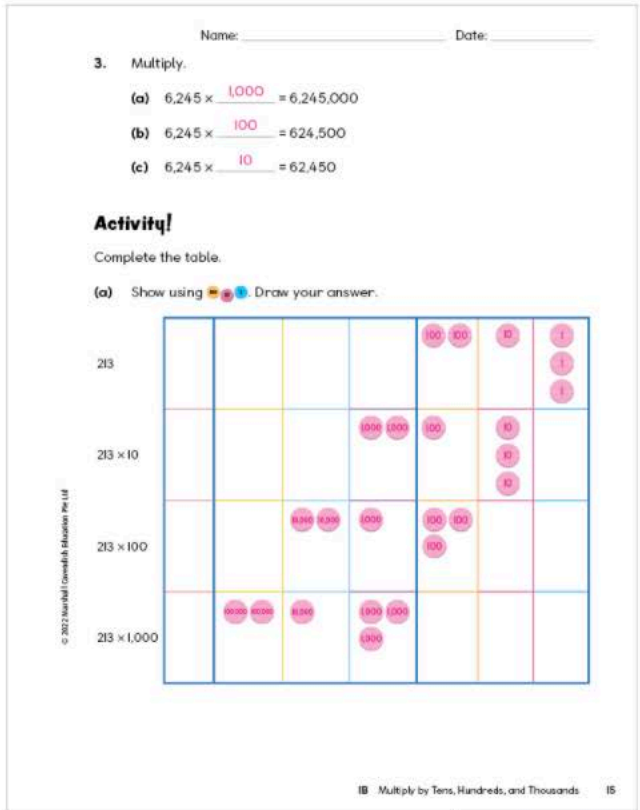

Name: _____ Date: _____

3. Multiply.

(a) 6,245 × 1,000 = 6,245,000

(b) 6,245 × 100 = 624,500

(c) 6,245 × 10 = 62,450

Activity!

Complete the table.

(a) Show using . Draw your answer.

213						
213 × 10						
213 × 100						
213 × 1,000						

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Best Practice

The intent of this lesson is for students to use known facts and patterns to multiply numbers by 10, 100, and 1,000. Encourage students to look for patterns within each problem and make generalizations.

Learn Together (pages 14 to 17) 10 minutes

- Group students in pairs or small groups to answer Questions 1 to 5.
- **QUESTION 1** requires students to multiply a 3-digit number by 10, 100, and 1,000 and to observe a pattern when given a pictorial representation.

What does it mean to multiply 341 by 10? to find the value of 10 groups of 341 or 341 groups of 10

Encourage students to use a colored pencil or highlighter to highlight the pattern they noticed in Question 1.

What pattern do you notice when you multiply 341 by 10, 100, and 1,000? The product has the same number of zeros as the number it was multiplied by.

- **QUESTION 2** requires students to multiply a 3-digit number with zero as a placeholder by 10, 100, and 1,000.

How can you use place value to help you determine the product? I can think of the problems as 704 × 1 ten, 704 × 1 hundred, and 704 × 1 thousand. **How does the product reflect the place value?** The number of places that the digits 7, 0, and 4 moved to the left in the product correspond to the number of zeros in 10, 100, and 1,000.

Caution

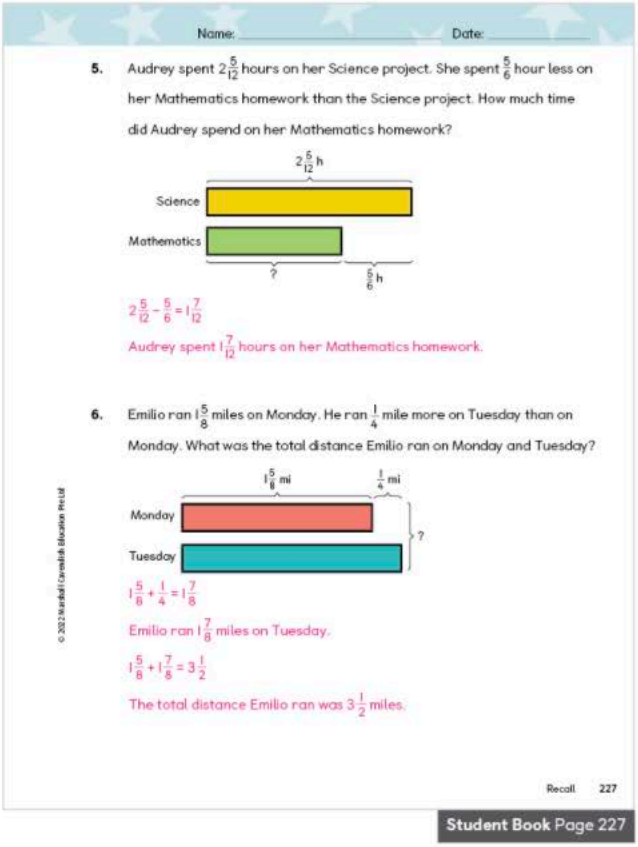
Be careful of prompting students to count the number of zeros as a way to multiply by 10, 100, or 1,000 especially when a number has a zero as placeholder. Reinforce the use of place value to multiply by 10, 100, or 1,000. Encourage students to use the correct vocabulary to explain their thinking. For example, instead of saying "add 1 zero to 706 to get the product of 706 × 10," say "the digits 7, 0, and 6 moved one place to the left."

Chapter 5

WORD PROBLEMS: THE FOUR OPERATIONS OF FRACTIONS

Across-Grades Progression

Looking Back	Looking Here	Looking Ahead
Grade 4 Chapter 5 **Section 5D Word Problems: Add and Subtract Like Fractions** • One-Step Word Problems • Two-Part Word Problems • Two-Step Word Problems **Grade 4 Chapter 6** **Section 6C Word Problems: Add and Subtract Mixed Numbers** • One-Step Word Problems • Two-Part Word Problems • Two-Step Word Problems **Grade 5 Chapter 3** **Section 3C Word Problems: Add and Subtract Unlike Fractions and Mixed Numbers** • Two-Part Word Problems • Two-Step Word Problems **Grade 5 Chapter 4** **Section 4A Product of Fractions and Whole Numbers** • Word Problems **Section 4B Product of Fractions** • Word Problems **Section 4E Divide a Fraction by a Whole Number** • Word Problems **Section 4F Divide a Whole Number by a Unit Fraction** • Word Problems	**Grade 5 Chapter 5** **Section 5A Word Problems** • Solve Part-Whole and Comparison Problems • Solve Problems Using the Unitary Method • Solve Problems Involving Finding a Fraction of a Fraction	**Grade 6** **Fractions and Decimals** • Solve word problems involving division of fractions by fractions



Name: _____ Date: _____

5. Audrey spent $2\frac{5}{12}$ hours on her Science project. She spent $\frac{5}{6}$ hour less on her Mathematics homework than the Science project. How much time did Audrey spend on her Mathematics homework?

$2\frac{5}{12} - \frac{5}{6} = 1\frac{7}{12}$

Audrey spent $1\frac{7}{12}$ hours on her Mathematics homework.

6. Emilio ran $1\frac{5}{8}$ miles on Monday. He ran $\frac{1}{4}$ mile more on Tuesday than on Monday. What was the total distance Emilio ran on Monday and Tuesday?

$1\frac{5}{8} + \frac{1}{4} = 1\frac{7}{8}$

Emilio ran $1\frac{7}{8}$ miles on Tuesday.

$1\frac{5}{8} + 1\frac{7}{8} = 3\frac{1}{2}$

The total distance Emilio ran was $3\frac{1}{2}$ miles.

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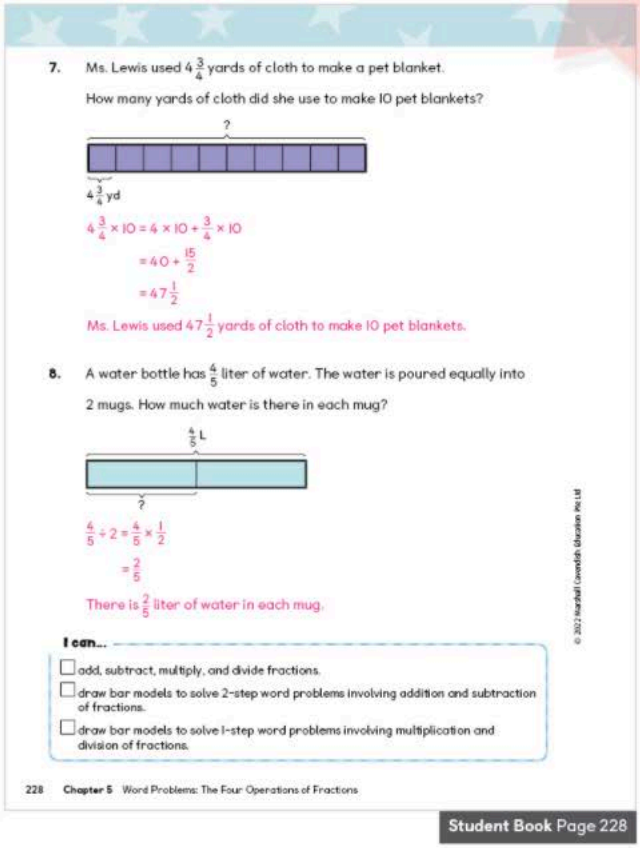

7. Ms. Lewis used $4\frac{3}{4}$ yards of cloth to make a pet blanket.

How many yards of cloth did she use to make 10 pet blankets?

$4\frac{3}{4} \times 10 = 4 \times 10 + \frac{3}{4} \times 10$

$= 40 + \frac{15}{2}$

$= 47\frac{1}{2}$

Ms. Lewis used $47\frac{1}{2}$ yards of cloth to make 10 pet blankets.

8. A water bottle has $\frac{4}{5}$ liter of water. The water is poured equally into 2 mugs. How much water is there in each mug?

$\frac{4}{5} \div 2 = \frac{4}{5} \times \frac{1}{2}$

$= \frac{2}{5}$

There is $\frac{2}{5}$ liter of water in each mug.

I can...

- ☐ add, subtract, multiply, and divide fractions.
- ☐ draw bar models to solve 2-step word problems involving addition and subtraction of fractions.
- ☐ draw bar models to solve 1-step word problems involving multiplication and division of fractions.

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QUESTION 5 assesses students' ability to solve a one-step word problem involving subtraction of fractions.

- Provide students with bar model strips (TR05) to model the problem.
- **How did you model the problem using bar model strips? What do you know about the problem?** Audrey spent $2\frac{5}{12}$ hours on her Science project; she spent $\frac{5}{6}$ hour less on her Mathematics homework. **What do you need to find?** the time she spent on her Mathematics homework **What operation will you use? Why? How can you check your answer?**

QUESTION 6 assesses students' ability to solve a two-step word problem involving addition of fractions.

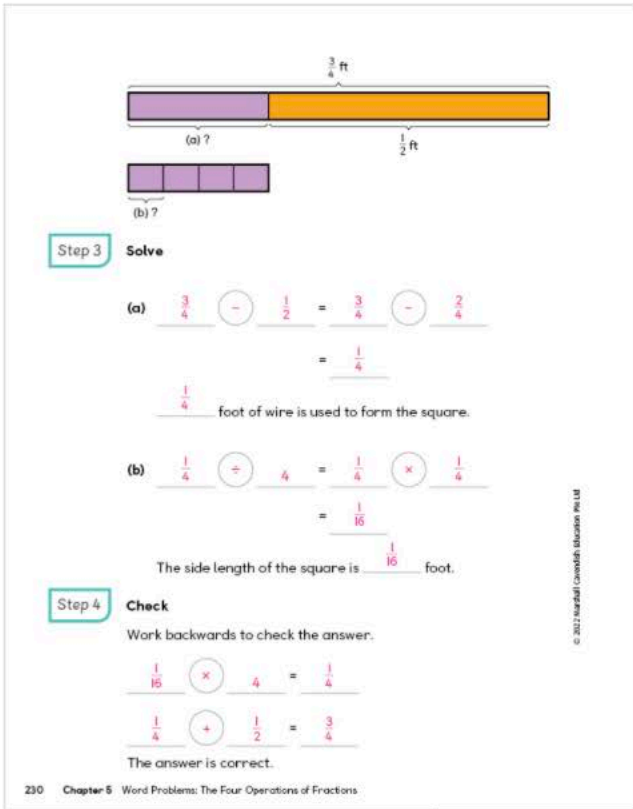
- Provide students with bar model strips (TR05) to model the problem.
- Use similar prompts as Question 5 for Question 6.

QUESTION 7 assesses students' ability to solve a one-step word problem involving multiplication of fractions.

- Provide students with bar model strips (TR05) to model the problem.
- Use similar prompts as Question 5 for Question 7.

QUESTION 8 assesses students' ability to solve a one-step word problem involving dividing a fraction by a whole number.

- Provide students with bar model strips (TR05) to model the problem.
- Use similar prompts as Question 5 for Question 8.



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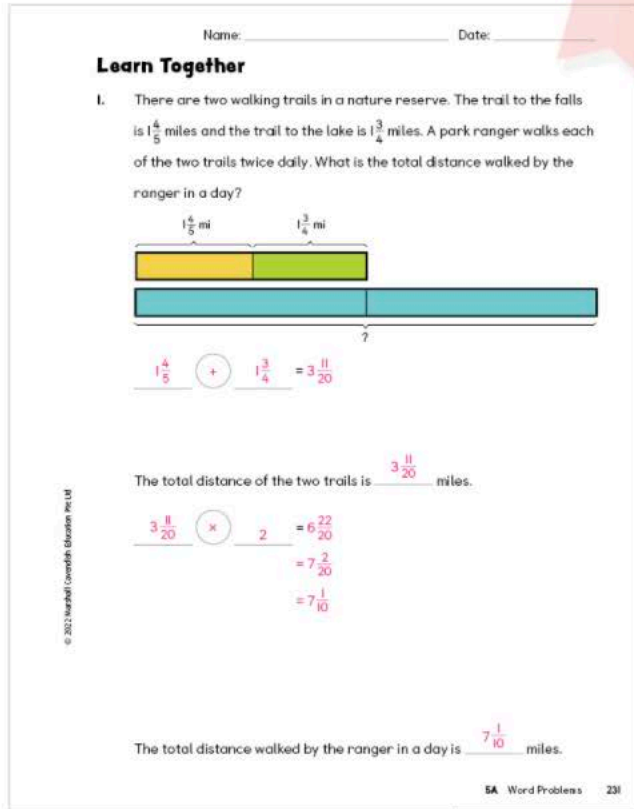

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continued

subtraction **How does knowing the properties of a square help you solve part (b)?** A square has 4 equal sides. I divide the length of the wire by 4 to find its side length.

- Invite students to use the bar model strips to represent the problem. Remind them to label their bar model to show parts (a) and (b).

How does the bar model represent the problem? It shows the length of wire used and left over, and the 4 side lengths represented by 4 equal parts.

Step 3 Solve

- Encourage students to use strategies from previous chapters to solve the problem.

What is the length of wire used by Luis to form the square? $\frac{1}{4}$ foot **How do you know?** I subtracted $\frac{1}{2}$ from $\frac{3}{4}$. **How did you find the side length of the square?** I divided $\frac{1}{4}$ by 4 to get $\frac{1}{16}$.

Step 4 Check

- Prompt students to suggest ways to check if the answers in Step 3 are correct. Encourage students to work backwards to check their answer.

Learn Together (pages 231 and 232) 15 minutes

- Group students in pairs or small groups to answer Questions 1 and 2.
- **QUESTION 1** requires students to solve a two-step part-whole word problem using bar models.

What is the problem about? There are two trails in a nature reserve. One of the trails is $1\frac{4}{5}$ miles long and the other trail is $1\frac{3}{4}$ miles long. A park ranger walks the two trails twice daily. **What do you need to find?** the total distance the park ranger walks in a day **What ideas do you have to solve this problem?** I can find the total distance of the two trails first, then multiply the answer by 2; I can multiply each distance by 2, then add the two distances together.

- Invite students to use the bar model strips to represent the problem.

What type of bar model do you get? part-whole **Why?** I am finding the total distance of the two trails.

- Display the model on page 231. Prompt students to compare their model with the model in the book.

Which method does the model show? The first bar shows the total distance of the two trails. The second bar shows doubling that distance.