

Fourth Grade
Math
with Confidence

Instructor Guide

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WELL-TRAINED MIND PRESS

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Welcome to Fourth Grade Math with Confidence!

Fourth Grade Math with Confidence is a complete math curriculum that will give your child a solid foundation in math. It's **hands-on and fun**, with thorough coverage of fourth-grade math skills:

- multiplying and dividing multi-digit numbers
- adding and subtracting fractions and mixed numbers
- equivalent fractions and decimals
- perimeter and area
- lines, angles, quadrilaterals, and triangles
- converting units to solve measurement problems
- line plots and averages
- multi-step word problems

The incremental, confidence-building lessons will help your child develop a strong understanding of math, step by step. Plus, daily review ensures she fully masters what she has learned in previous lessons. With this blend of **deep conceptual understanding** and **traditional skill practice**, you'll give your child a thorough fourth-grade math education.

Fun games like Fraction Three in a Row, Race to 180°, and Decimal War will help your child develop a **positive attitude** toward math. You'll also find optional enrichment lessons at the end of each unit, with suggestions for delightful math picture books and real-world math activities that help your child appreciate the importance of math in everyday life.

Besides this Instructor Guide, *Fourth Grade Math with Confidence* also includes **two colorful, engaging Student Workbooks**. You'll find three workbook pages for each lesson. First, you'll use the Lesson Activities page to teach your child a new topic. Then, your child will complete the Practice and Review pages to practice the new concept and review previously-learned skills. Workbook Part A covers Units 1-8, and Workbook Part B covers Units 9-16.

Many parents worry about their ability to teach math as their children move beyond the primary years. If that's the case for you, don't worry: I promise to guide you every step of the way! *Fourth Grade Math with Confidence* is full of features that will help you teach math with confidence all year long:

- **Scripted, open-and-go lessons** help you clearly explain and teach new math concepts
- **Explanatory notes** help you understand more deeply how children learn math so you feel well-equipped to teach your child
- **Unit Wrap-ups and Checkpoints** at the end of each unit provide assessment and give you guidance on whether your child is ready to move on to the next unit

In the next section, you'll learn how the curriculum is organized and how to get your materials ready. Invest a little time reading this section now (and getting your Math Kit ready), and you'll be ready to teach math like a pro all year long.

Wishing you a joyful year of fourth grade math!
Kate Snow

Introduction

The Goals of *Fourth Grade Math with Confidence*

Fourth Grade Math with Confidence aims to help children become confident and capable math students, with a deep understanding of math concepts, proficiency and fluency with fundamental skills, and a positive attitude toward math.

Deep Conceptual Understanding

You'll focus on one main topic per unit so your child can build deep conceptual knowledge of the new material. (Educators call this a *mastery approach* to new content.) Each new lesson in the unit builds on the previous one so your child gradually develops thorough understanding.

Proficiency with Fundamental Skills

Children need lots of practice to master the basic skills necessary for proficiency in math. *Fourth Grade Math with Confidence* provides continual, ongoing review of these core skills so your child fully grasps them by the end of the year. (Educators call this a *spiral approach* to review, because children periodically revisit topics, just as the curve of a spiral returns to the same point on a circle.)

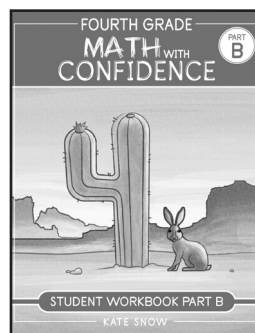
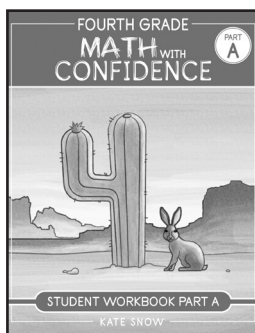
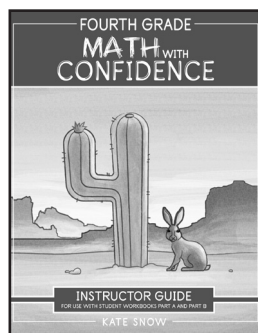
Positive Attitude

The lessons in *Fourth Grade Math with Confidence* include lots of games and hands-on learning so your child enjoys and even looks forward to math time. Optional enrichment lessons at the end of each unit (with a picture book suggestion and math extension activity) provide a break from the usual routine and help your child appreciate how math is used in everyday life.

Overview

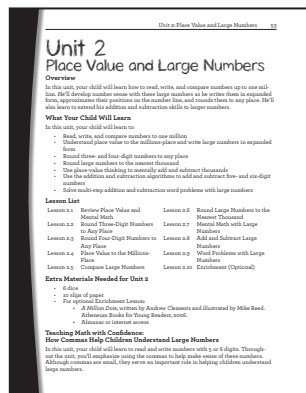
You'll need three books to teach *Fourth Grade Math with Confidence*. All three books are essential for the program.

- This Instructor Guide contains the scripted lesson plans for the entire year.
- Workbook Part A contains the workbook pages for the first half of the year (Units 1-8).
- Workbook Part B contains the workbook pages for the second half of the year (Units 9-16).



Units

Fourth Grade Math with Confidence is organized into 16 units. Each unit focuses on developing thorough understanding of one main concept, such as multi-digit multiplication, long division, or equivalent fractions. Units vary in length from 6 to 12 lessons, and there are a total of 144 lessons. The final lesson in each unit is an optional enrichment lesson.



The preview for each unit includes the following:

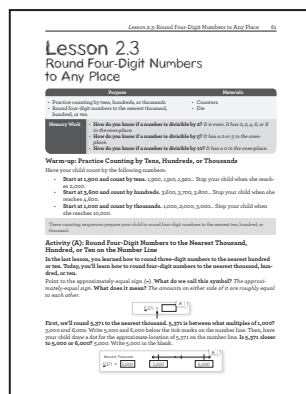
- **Overview.** A brief summary of what you'll teach your child.
- **What Your Child Will Learn.** A detailed list of objectives for the unit.
- **Lesson List.** The full list of lessons included in the unit.
- **Extra Materials.** This section gives you a heads-up if you need any extra materials for the unit. You'll sometimes need to supplement your regular math materials with a few everyday household items, such as markers, tape, or scissors. The optional enrichment lessons also usually require some extra materials.
- **Teaching Math with Confidence.** These notes help you understand more deeply how children learn math so that you're well-prepared to teach the new concepts.

Lessons

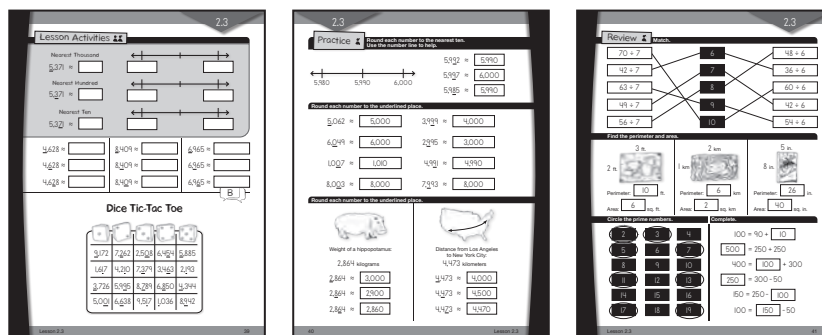
Each lesson includes several short and varied activities to keep your child engaged and attentive. You'll need both the Instructor Guide and Student Workbook for every lesson. Most pilot families spent an average of 25-35 minutes on each lesson, with 10-15 minutes of parent-led instruction and 15-20 minutes of independent work. However, this will vary depending on your teaching style and your child's learning style—and whether you have any toddlers interrupting you!

This Instructor Guide contains the scripted, open-and-go lesson plans. Within the Instructor Guide:

- **Bold text** indicates what you are to say.
- *Italic text* provides sample answers.
- Gray-highlighted text indicates explanatory notes.

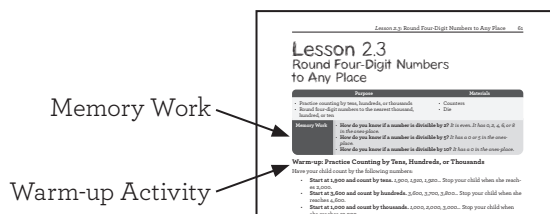


The Student Workbook includes three workbook pages for each lesson. First, you'll use the Lesson Activities page to teach your child the new concept or skill. Then, your child will complete the Practice and Review pages to reinforce what she learned in the lesson and review previously-learned skills.



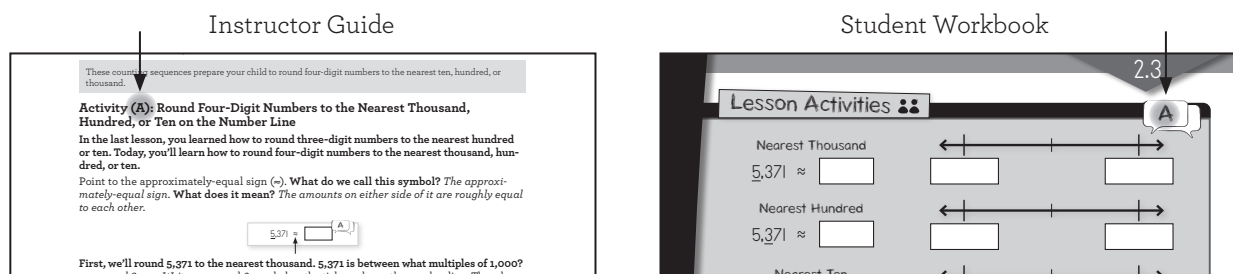
Memory work and warm-up activity with parent

Each lesson begins with a few memory work review questions and a quick warm-up activity. The memory work questions are listed at the top of each lesson. Reviewing a few questions daily helps your child master these important facts and vocabulary words. The warm-up activity eases your child into math time and helps start the lesson on a confident and positive note.



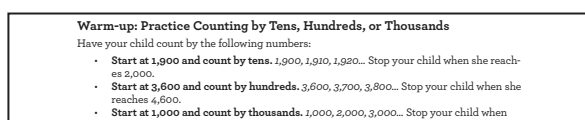
Lesson activities with parent

Next, you'll use the scripted lesson plan and Lesson Activities page to teach your child new concepts and skills. The Instructor Guide and Lesson Activities workbook pages are lettered so that it's easy to see how they align. Some activities are only in the Instructor Guide, without a matching section on the Lesson Activities page.



The activity headings and images in the Instructor Guide are lettered to help you find the matching activity in the Student Workbook.

Instructor Guide



Some activity headings in the Instructor Guide do not have a letter. These activities do not have a matching section in the Student Workbook, and they are completed either orally or with hands-on materials instead.

Independent practice

Last, your child will complete the Practice and Review workbook pages. Most fourth graders will be able to complete these workbook pages independently, but some may need help reading and interpreting the directions.

Try to check the workbook pages as soon as your child finishes them. This immediate feedback shows your child that you value his work, and it helps prevent mistakes from becoming ingrained habits. You'll find answer keys for the Practice and Review pages at the end of each unit.

Enrichment Lessons (Optional)

Optional enrichment lessons are scheduled at the end of each unit. The Instructor Guide provides suggestions for a related picture book and enrichment activity, while the Student Workbook includes a two-page Unit Wrap-Up for your child to complete.

Many parents and children find that the enrichment lessons are their favorite part of the program. (Siblings often enjoy participating in them, too!) However, these lessons are completely optional. You are free to choose the ones that sound the most fun for your family, or skip them entirely if your schedule is too full.

Picture book

Most of the suggested books relate to the math studied in the unit, but some expose your child to other interesting math topics. **The picture books are not required.** You do not need to buy every book or track down every book in your library system. You can also use a book on a similar topic as a substitute.

Enrichment activity

The enrichment activities help your child understand and appreciate how math is used in everyday life. You'll find suggestions for art projects, real-life applications, research activities, and more to make math come alive for your child.

Unit Wrap-up (review and assessment)

The Unit Wrap-Ups provide two pages of additional exercises for the concepts and skills your child learned in the unit. You can use them to casually review the unit, or you can use them as tests to assess your child's progress more formally. Either way, children and parents often find it very satisfying to see this concrete evidence of growth. If you live in a state where you're required to provide evidence of learning, you may want to save them for your child's portfolio.

Unit Wrap-Up 2.10

Write each number in standard form.

Words	Standard Form
Five hundred thousand six hundred twenty	
Five hundred six thousand twenty	
99,000 + 3,000 =	
My six thousand two hundred	
My six thousand two	
Five hundred sixty-two thousand	

Write each number in expanded form.

75,878 = _____

395,000 = _____

100,89 = _____

Round to the underlined place.

3,282 = _____

4,561 = _____

5,985 = _____

36,847 = _____

653,285 = _____

Use the clues to solve the number riddle.

- I am greater than 80,000 and less than 90,000.
- The digit in my hundreds place is 3.
- The digit in my hundreds place is 2 more than the digit in my tens place.
- I am divisible by 10.

Lesson 2.10

Unit Wrap-Up 2.11

Complete.

300,000 + 100,000 = _____

300,000 + 30,000 = _____

99,000 + 3,000 = _____

100,000 - 35,000 = _____

100,000 - 10,000 = _____

50,000 - 25,000 = _____

Complete with <, =, or >.

99,999 ☐ 100,000

74,017 ☐ 74,701

53,284 ☐ 53,284

680,562 ☐ 680,000

739,865 ☐ 739,864

247,842 ☐ 247,842

Complete.

5 9 7 3 4 6

6 7 4 0 3 9

2 9 1 5 7 8

2 9 9 9 9 9

6 7 5 1 7 5

8 7 5 6 4

1 6 2 3 8 5

Solve. Write the equations you can.

The bookstore had \$475,388 in sales this year. It had \$435,402 in sales last year. What were its total sales for both years?

How much greater were the book store's sales this year than last year?

Lesson 2.11

Your child is not expected to fully master every skill from every unit before moving on to the next unit. See below for more on pacing and assessing your child's progress.

Pacing and Checkpoints

Fourth Grade Math with Confidence provides lots of flexibility so your child can learn at his own pace. You know your child best, and you are always welcome to slow down or speed up the pace of the lessons based on your child's needs.

Is My Child Ready to Start *Fourth Grade Math with Confidence*?

Your child is ready to begin this program if he can:

- Read, write, compare, and understand place value in numbers to 10,000.
- Use the traditional process to add and subtract 4-digit numbers written vertically. (You might know these problems as “stack math” or “borrowing and carrying.”)
- Name answers to the multiplication and division facts (up to 10×10 and $100 \div 10$). She should be able to recall the answers to most within 3 seconds or so. It's okay if she's still developing fluency with the tricky 7s, 8s, and 9s.
- Use addition, subtraction, multiplication, and division to solve word problems, including two-step word problems.
- Find the area and perimeter of rectangles.
- Read, write, and compare simple fractions.

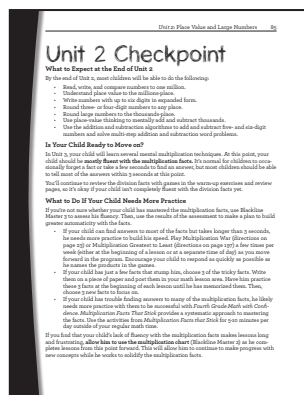
All of these skills are reviewed in the first few units, so don't worry if your child needs a refresher on a few of them. However, if your child is shaky on many of these skills, *Third Grade Math with Confidence* may be a better fit for her. Math skills build incrementally, and it will be difficult for your child to develop proficiency and confidence with the new fourth-grade skills if she has a weak foundation.

If your child is not fluent with the multiplication facts but knows the rest of the skills listed above, she is probably ready to begin *Fourth Grade Math with Confidence*. Make sure to add 5 minutes of daily multiplication fact practice to each lesson until your child becomes more fluent with the facts. *Multiplication Facts that Stick* (also available from Well-Trained Mind Press) provide quick games to help your child master these essential skills. The Unit 2 Checkpoint (page 85) also provides more guidance on developing multiplication fact fluency.

How Do I Know Whether to Stick with a Lesson (or Unit) or Move On?

Most children need lots of exposure to a new concept or skill before they fully grasp it. Each lesson in *Fourth Grade Math with Confidence* gently builds on the previous one, but your child doesn't need to completely master every lesson before moving on to the next. The program includes many opportunities for practice and review before your child is expected to achieve full proficiency with a topic.

In general, continue teaching new lessons until you reach the end of a unit. At the end of each unit, you'll find a Checkpoint that provides guidance on whether your child is ready to move on to the next unit.



The Checkpoints are divided into three parts:

- **What to Expect at the End of the Unit** This list of skills tells you what fourth graders typically are able to do at the end of each unit.
- **Is Your Child Ready to Move On?** This section tells you what your child needs to have mastered before moving on to the next unit.
- **What to Do if Your Child Needs More Practice** If your child isn't quite ready to move on, this section gives you options for reviewing and practicing the skills your child needs to master before the next unit. (This section is omitted if no specific skills are necessary for the next unit.)

For most units, your child is not expected to fully master all of the material from the current unit before moving on. For example, in Unit 4, your child will learn how to subtract mixed numbers. He'll continue to practice this skill as he studies division in Unit 5, but he does not need to be completely fluent with mixed number subtraction before starting the new unit.

Scheduling

Fourth Grade Math with Confidence includes 144 lessons. 128 are regular lessons, and 16 are optional enrichment lessons. You're welcome to adjust the number of lessons you teach per week to best fit your family's schedule. Some families prefer to teach math 5 days per week, while others prefer to teach math 4 days per week and leave one day open for co-ops, errands, or field trips.

Use the following guidelines to plan your year:

- If you teach 4 lessons per week and teach all the enrichment lessons, *Fourth Grade Math with Confidence* will take you 36 weeks.
- If you teach 4 lessons per week and skip the enrichment lessons, *Fourth Grade Math with Confidence* will take you 32 weeks.
- If you teach 5 lessons per week and teach all the enrichment lessons, *Fourth Grade Math with Confidence* will take you 29 weeks.
- If you teach 5 lessons per week and skip the enrichment lessons, *Fourth Grade Math with Confidence* will take you 26 weeks.

Use this list as a rough guide to planning your year, but don't set it in stone. You'll generally be able to cover one lesson per day, but you may occasionally find that you want to split a lesson over two days.

How Can I Adjust the Lessons to Best Fit My Child and My Schedule?

Children vary tremendously in how quickly they learn new math concepts and skills. Use these suggestions to adjust the lessons to best fit your child's needs and your family's schedule.

- If your student is a fast processor or picks up math skills quickly, you may be able to condense lessons and teach more than one lesson in one day. If so, teach the concepts that are new to your child. Then, have your child complete a selection of exercises on the corresponding Practice and Review pages.
- If your child has a slower processing speed or takes a while to grasp math concepts and skills, some lessons may take longer that you would like (or, longer than your child is able to stay engaged and attentive). If that's the case, set a timer for your desired lesson length, stop when the timer goes off, and continue the next day where you left off. In the elementary years, you are setting a foundation for a lifetime of proficiency and confidence in math. It's okay not to rush through these essential skills.

- If your child doesn't have the stamina to complete the Practice and Review pages at the same time, split the lesson into two parts. Do the Lesson Activities page and Practice page during one part of the day, and then have your child complete the Review page at a different time of the day.
- Adjust your use of manipulatives (like base-ten blocks or play money) to fit your child's learning style. If your child readily understands a skill and doesn't enjoy using manipulatives, allow her to solve the problems without them. If your child learns best with a lot of visual and hands-on reinforcement, allow her to use manipulatives to model problems as much as she needs. Cut out some of the practice problems if the extra manipulative work makes the exercises take too long.
- Games provide a fun way to practice math skills, and they can be a great way to bond with your child. However, if your child doesn't enjoy games, or you don't have time for a game on a particular day, choose a few problems from the game for your child to solve instead. That way, she'll still get the extra practice that the game was meant to provide.
- Don't worry if you have a bad day every once in a while. Extra tiredness, oncoming illness, or just plain grumpiness can make for a less-than-cheerful math lesson. It's perfectly normal for children to occasionally get frustrated, and it doesn't mean that you're a bad math teacher or need to change the way you teach. If emotions rise during math, just cut the lesson short and resume later in the day or the next day. Most of the time, you'll find that the next day goes much better.

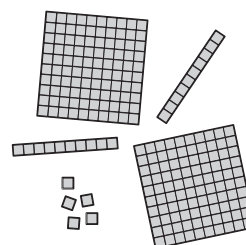
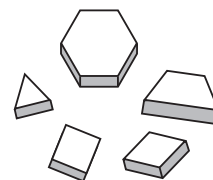
What You'll Need

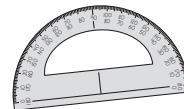
You'll use simple household items to make math hands-on, concrete, and fun in *Fourth Grade Math with Confidence*. Most lessons only require materials from your Math Kit, but you'll also sometimes use everyday objects to enhance the lessons.

How to Create Your Math Kit

You'll use materials from your Math Kit in most lessons. Stick the following materials in a box or basket so they're always ready to go, and keep them handy when you're teaching.

- **40 small counters (20 each of 2 different colors).** Any type of small object (such as plastic tiles, Legos, blocks, or plastic discs) is fine.
- **Play money (20 one-dollar bills, 20 ten-dollar bills, 10 hundred-dollar bills).** Play money from a toy cash register or board game works well, or you can copy and cut out the play money on Blackline Master 11.
- **Pattern blocks.** You will use pattern blocks to teach your child about fractions and mixed numbers, as well as angles. Wood, plastic, or foam pattern blocks are all fine. Real pattern blocks are easiest to use, but you can photocopy and color Blackline Master 9 (page 567) if you don't have access to real pattern blocks.
- **Base-ten blocks.** Look for a set with at least 20 unit blocks, 20 rods, and 10 flats. Unlike second and third grade, you'll use base-ten blocks only occasionally this year. So, if you don't already own base-ten blocks, you may want to copy and cut out the paper blocks on Blackline Master 10 (page 569) rather than buying a set.
- **1-foot (or 30-centimeter) ruler.** Make sure your ruler is labeled with both inches and centimeters, as your child will use both units this year.





- **Protractor.** Any clear plastic protractor is fine.
- **2 packs of playing cards and 2 dice.** You'll use playing cards and dice for many of the games. Any standard 52-card decks and regular, six-sided dice will work fine.
- **Blank paper.** Any kind of paper is fine, including plain copy paper. Keep a few pages handy as you'll sometimes need scrap paper.
- **Pencils.** Keep sharp pencils on hand for lessons and workbook pages.

You will also sometimes use Blackline Masters (from the back of this Instructor Guide). Most of the Blackline Masters are used for only a few lessons, but there are a few you may want to put in plastic page protectors for safe-keeping. See page 543 for more information.



You will occasionally need to save items for future lessons. This symbol will alert you if you need to save anything.

Other Supplies Needed

You'll only need your Math Kit for most lessons, but sometimes you'll also need a few other common household items. You'll find these items listed in three different places in the curriculum to make sure you always know what you need:

- The preview for each unit lists all extra household items needed.
- The top of each lesson lists all supplies you'll need to teach that lesson. These lists include items from your Math Kit as well as extra household items.
- You'll find the complete list of household items needed throughout the year on pages 541-542.

Don't feel you have to gather the extra household items now. Most are common things (like colored pencils or markers, a paper clip, or a tape measure) that you can grab right before you begin the lesson.

Helpful Resources

You'll find an appendix of helpful resources at the back of this book:

- Memory Work
- Complete Picture Book List
- Scope and Sequence
- Materials List
- Blackline Masters

Unit 3

Mental Multiplication

Overview

In this unit, your child will build on her multiplication and place-value skills to mentally multiply larger numbers. She'll also learn how to solve problems with parentheses, find answers to the $\times 11$ and $\times 12$ facts, and use the distributive property to solve problems.

Later this year, your child will learn the written process for multi-digit multiplication. This unit builds both the conceptual understanding and procedural skills necessary to master this complex process.

What Your Child Will Learn

In this unit, your child will learn to:

- Mentally multiply one-digit numbers by a multiple of 10, 100, or 1,000 (i.e., 4×500 or $3,000 \times 6$)
- Mentally multiply a multiple of 10 by a multiple of 10 (i.e., 40×80)
- Write and solve expressions with parentheses
- Understand the distributive property and use it to solve problems
- Find answers for the $\times 11$ and $\times 12$ facts
- Use the area model and box method to multiply two-digit numbers by one-digit numbers
- Solve multiplication word problems, including multiplicative comparison problems and multi-step problems

Lesson List

Lesson 3.1	Comparison Word Problems	Lesson 3.6	$\times 11$ Facts
Lesson 3.2	Mental Multiplication, Part 1	Lesson 3.7	$\times 12$ Facts
Lesson 3.3	Mental Multiplication, Part 2	Lesson 3.8	The Box Method
Lesson 3.4	Parentheses	Lesson 3.9	Multiplication Word Problems
Lesson 3.5	The Distributive Property	Lesson 3.10	Enrichment (Optional)

Extra Materials Needed for Unit 3

- Tape
- Measuring tape or ruler
- Paper clip
- For optional Enrichment Lesson:
 - × *Math Curse*, Jon Scieszka and Lane Smith. Viking, 1995.
 - × Large piece of posterboard (or 9 sheets of paper and tape)
 - × 9 slips of paper

Teaching Math with Confidence: Understanding the Distributive Property

You may dimly remember memorizing the distributive property sometime in your middle or high school math classes. The property is usually summarized algebraically with letters and then used to “multiply out” or simplify equations.

$$a(b + c) = a \times b + a \times c$$

The distributive property expressed algebraically.

If you struggled in your algebra classes (or have blocked out those memories entirely), the idea of teaching the distributive property to your child may feel intimidating. But, don’t worry! The distributive property simply expresses a common-sense idea: Multiplying the sum of two numbers yields the same result as if you multiply the numbers separately and then add the products.

For example, say you buy lunch for 3 people at a concession stand. Each person gets a chicken sandwich for \$8 and a bottle of water for \$2. There are two different ways to find the total cost. One way is to think of the order as 3 combo meals. Each person’s combo costs \$10, so the total cost for 3 people is \$30.



$$(8 + 2) \times 3 = \$30$$

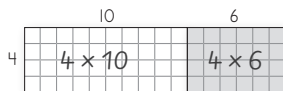
One way to find the total cost is to think of the order as 3 combo meals. Each meal costs \$10, so the total order costs \$30.

Another way is to find the cost of the chicken sandwiches, find the cost of the bottles of water, and add them together. The 3 chicken sandwiches cost \$24, and the 3 bottles of water cost \$6. So, the total cost for lunch is \$30. No matter how you calculate it, the total cost is the same.

$$(8 \times 3) + (2 \times 3) = \$30$$

Another way to find the total cost is to find the cost of the chicken sandwiches and water bottles separately, then add. The chicken sandwiches cost \$24, and the bottled waters cost \$6, so the order costs \$30 in all.

In *Third Grade Math with Confidence*, your child informally used the distributive property to learn the multiplication facts and find the areas of large rectangles. In this unit, you’ll teach her to use the distributive property to multiply one-digit numbers times two-digit numbers. For example, to find 4 times 16, she’ll break 16 into 10 and 6, multiply each part separately by 4, and then add to find the final answer.



$$4 \times 16 = (4 \times 10) + (4 \times 6) = 64$$

Later in the year, she’ll discover that the distributive property also lies at the heart of the traditional written process for multi-digit multiplication. By solidifying her understanding of the distributive property now, you build a solid conceptual foundation for that challenging skill.

Lesson 3.5

The Distributive Property

Purpose	Materials
- Review properties of multiplication - Write equations with parentheses to match multi-step problems - Use the distributive property as a shortcut for solving problems	None
Memory Work	What do parentheses mean in a math problem? <i>Do this first.</i>

In this lesson, you'll introduce the distributive property to your child as a shortcut for solving multiplication word problems. Your child is not expected to memorize a formal definition for the distributive property in fourth grade, and she'll learn to apply it in a variety of contexts throughout the year. See the Unit 3 **Teaching Math with Confidence** for more on why the distributive property is so important.

Warm-up: Review Properties of Multiplication

Last year, you learned some multiplication rules that hold true for every number. We call these rules the *properties* of multiplication. We'll warm up today by reviewing some of these properties.

What's 4 times 0? 0. What's 100 times 0? 0. What's any number times 0? 0. One property of multiplication is that any number times 0 equals 0.

What's 4 times 1? 4. What's 100 times 1? 100. What's any number times 1? *The number.* Another property of multiplication is that any number times 1 equals the same number.

What's 4 times 3? 12. What's 3 times 4? 12. Another property of multiplication is that you can multiply in any order and still get the same answer.

Activity (A): Introduce the Distributive Property with Concession Stand Orders

Today, you'll learn about a property of multiplication called the *distributive property*. We'll use concession stand equations to learn about this property.

The first order today is for 4 bottled waters and 3 candies. One way to find the total cost is to multiply to find the cost of the bottled waters, multiply to find the cost of the candies, then add the two costs together.

Each bottle of water costs \$2, so first we multiply 4 times 2 to find their cost. What's 4 times 2? 8. Write 8 below the equation. Each pack of candy costs \$2, so we multiply 3 times 2 to find their cost. What's 3 times 2? 6. Write 6 below the equation. Last, we add to find the total cost. What's 8 plus 6? 14.

A handwritten-style diagram illustrating the distributive property. At the top, a box contains the text "4 bottled waters" and "3 candies". Below this, the text "Multiply, then add." is written. The equation $(4 \times 2) + (3 \times 2) =$ is shown, with "8" written below 4×2 and "6" written below 3×2 . To the right of the equation, a box contains the answer "\$14". A small speech bubble with the letter "A" is in the top right corner.

Another way to find the total cost is to first add to find the total number of items. Then, we can multiply the total number of items times 2, since all the items cost \$2.

The customer wants 4 bottled waters and 3 candies, so we add 4 plus 3 to find the total number of items. What's 4 plus 3? 7. Write 7 below the equation. Then, we multiply 7 times 2 to find the total cost. What's 7 times 2? 14. Write \$14 in the blank.

Add, then multiply. **A**

$$\begin{array}{r} (4 + 3) \times 2 = \boxed{\$14} \\ 7 \end{array}$$

We get the same answer to this problem no matter which way we solve it. We can multiply and then add. Or, we can add, and then multiply. Either way we get the same answer. This is called the distributive property of multiplication. You'll learn more about the distributive property throughout the rest of the unit.

Activity (B): Use the Distributive Property at the Concession Stand

The next order is for 3 chicken sandwiches and 7 veggie wraps. How much do chicken sandwiches cost? \$8. How much do veggie wraps cost? \$8. Both items cost \$8, so we can use the distributive property to quickly find the total cost.

How many items are in the order? 10. How do you know? *Sample answer: I added 3 plus 7.* Write “(3 + 7)” to begin an equation. Each of the 10 items costs \$8, so we can multiply the number of items by 8 to find the total cost of the order. Write “× 8 =” to continue the equation. Have your child complete the equation. How much does the order cost? \$80.

B

3 chicken sandwiches
7 veggie wraps

$$\begin{array}{r} (3 + 7) \times 8 = \$80 \\ 10 \end{array}$$

The next order is for 5 hot dogs and 4 bags of chips. How much does each hot dog cost? \$3. How much does each bag of chips cost? \$3. Every item costs \$3, so we can use the distributive property again to find the total cost. Have your child write and solve an equation to find the cost of the order.

B

5 hot dogs
4 chips

$$\begin{array}{r} (5 + 4) \times 3 = \$27 \\ 9 \end{array}$$

The next order is for 3 chicken sandwiches and 3 bottled waters. We can use the distributive property in a slightly different way to solve this problem. Let's think of this order as 3 combo meals. Each combo meal has 1 chicken sandwich and 1 bottle of water.

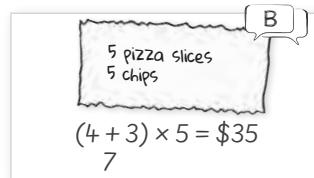
How much does each combo meal cost? \$10. How do you know? *Sample answer: I added 8 plus 2.* Write “(8 + 2)” to begin an equation. Each combo meal costs \$10, so we multiply 10 times 3 to find the total cost of the order. Write “× 3 =” to continue the equation. Have your child complete the equation. How much does the order cost? \$30.

B

3 chicken sandwiches
3 bottled waters

$$\begin{array}{r} (8 + 2) \times 3 = \$30 \\ 10 \end{array}$$

Have your child write and solve an equation to find the cost of the final order. Encourage her to think of the order as 5 combo meals, where each combo meal has 1 pizza slice and 1 bag of chips.



Independent Practice and Review

Have your child complete the Lesson 3.5 Practice and Review workbook pages.

Lesson 4.9

Add Mixed Numbers

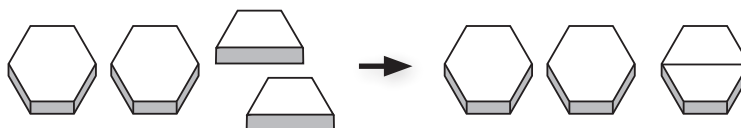
Purpose	Materials
• Use pattern blocks to regroup whole numbers and fractions into mixed numbers • Use the mixed number addition algorithm to add mixed numbers	• Pattern blocks • Paper clip
Memory Work	• What do we call the number to be divided? <i>The dividend.</i> • What do we call the number we divide by? <i>The divisor.</i> • What do we call the result when we divide two numbers? <i>The quotient.</i> • What do we call an amount that is left over after division? <i>The remainder.</i>

Some children are able to add and subtract mixed numbers mentally and find the algorithms tedious and unnecessary. If your child falls into this category, make sure to introduce the steps in the algorithms anyway so that she has the chance to observe the similarities between the algorithms for mixed numbers and whole numbers. Allow her to use whichever method she prefers as she solves the problems on the worksheets. See the Unit 4 **Teaching Math with Confidence** for more on why it's so important for your child to understand the algorithms for adding and subtracting mixed numbers.

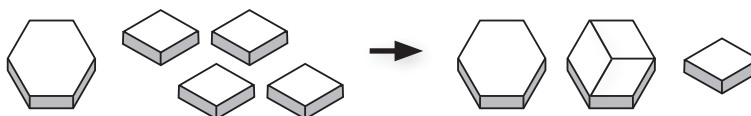
Warm-up: Combine Wholes and Fractional Parts with Pattern Blocks

Adding mixed numbers requires that your child regroup wholes and fractional parts into mixed numbers. This activity introduces this skill so your child can use it later in the lesson.

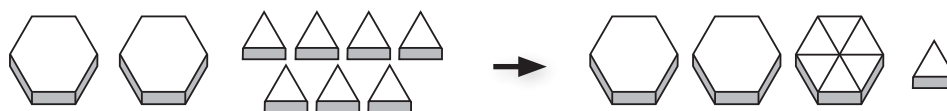
Place 2 hexagons and 2 trapezoids on the table. **How many wholes can you make from 2 and two-halves? 3. How many fractional parts will be left? None. 2 and two-halves equal 3 wholes.**



Place 1 hexagon and 4 diamonds on the table. **1 and four-thirds equals what mixed number? 2 and one-third.**



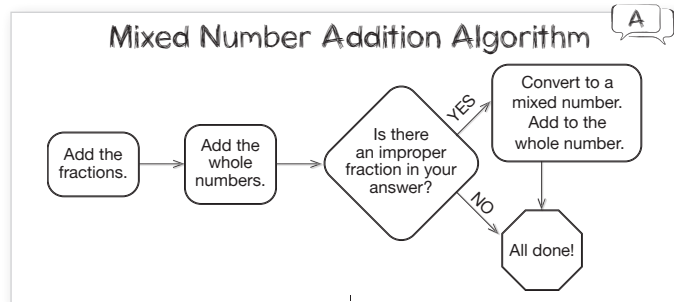
Place 2 hexagons and 7 triangles on the table. **2 and seven-sixths equals what mixed number? 3 and one-sixth.**



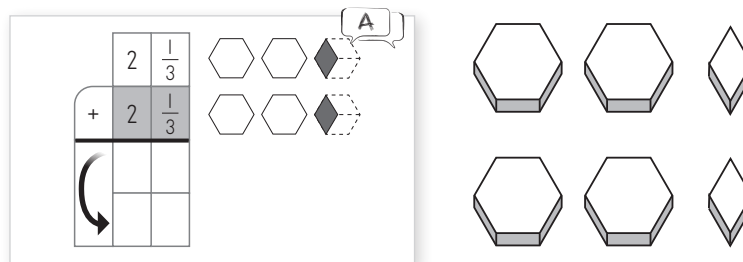
Activity (A): Add Mixed Numbers with the Mixed Number Addition Algorithm

You already know how to add fractions with the same denominator. Today, you'll learn how to add mixed numbers where the fractions have the same denominator.

Adding mixed numbers is a lot like adding whole numbers. We'll use the Mixed Number Addition Algorithm diagram as a guide.

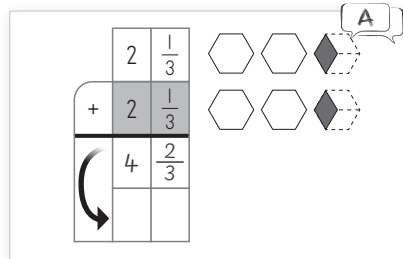


Read aloud the first problem: **2 and one-third plus 2 and one-third**. Arrange pattern blocks on the table to match the diagram.



The first step says: **Add the fractions.** What's one-third plus one-third? *Two-thirds*. Write $\frac{2}{3}$ as shown.

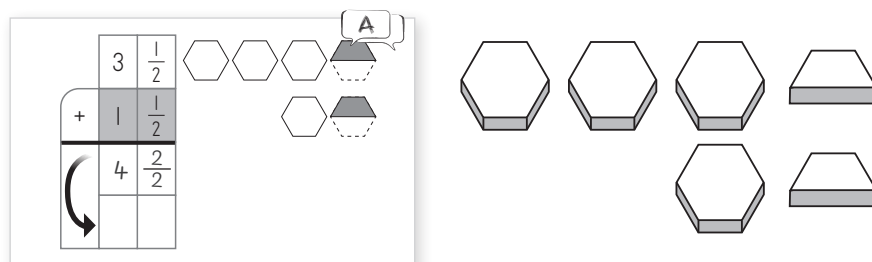
The next step says: **Add the whole numbers.** What's 2 plus 2? 4. Write 4 as shown.



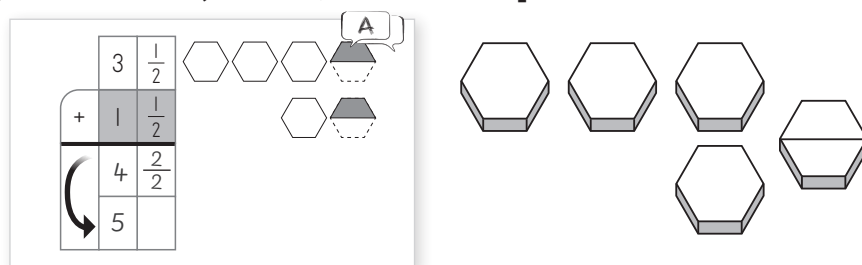
Point to the next step in the diagram. **The next step is a question: Is there an improper fraction in your answer?** No. If needed, remind your child that an improper fraction is a fraction where the numerator is greater than or equal to the denominator. **So, we follow the path labeled "No."** Trace your finger along the "No" arrow until you reach the final step. **You're done! 2 and one-third plus 2 and one-third equals 4 and two-thirds.** Leave the final space below the problem blank.

The extra space provides room for the final answer, in case the answer needs to be regrouped. See the next problem for an example of why this is sometimes necessary.

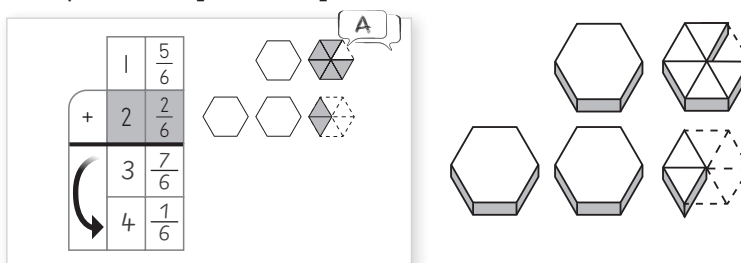
Read aloud the next problem: **3 and one-half plus 1 and one-half.** Arrange pattern blocks on the table to match the diagram. Have your child follow the first two steps in the algorithm to add the fractions and whole numbers.



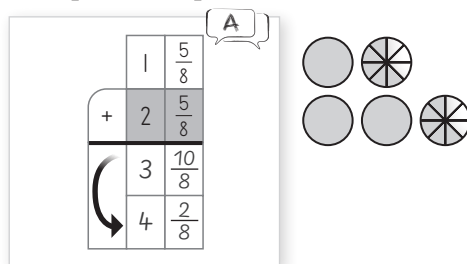
The next step is a question: **Is there an improper fraction in your answer?** Yes. So, we follow the path labeled “Yes.” Trace your finger along the “Yes” arrow until you reach the next step. **Convert to a mixed number. Add to the whole number. What does $2/2$ equal?** 1 whole. Push the two trapezoids together to make 1 whole. What’s 4 wholes plus 1 whole? 5. Write 5 as shown. **Now, you’re done! So, what’s 3 and one-half plus 1 and one-half?** 5.



Have your child solve the next problem in the same way. Help her convert the fraction to a mixed number when she reaches that step. **What mixed number does $7/6$ equal?** 1 and one-sixth. Push 6 diamonds together to make 1 whole. **What’s 3 wholes plus 1 and one-sixth?** 4 and one-sixth. Write $4 \frac{1}{6}$ to complete the problem.



The last problem involves adding eighths, so we can’t model this problem with pattern blocks. Instead, we’ll draw a simple circle sketch. Draw circles next to $1 \frac{5}{8}$ and $2 \frac{5}{8}$ as shown. Then, have your child complete the problem.



Drawing a sketch is a great way to visualize fraction problems and make sense of them. Make sure to draw a sketch if you ever feel confused by a fraction or mixed number addition problem.

How is the mixed number addition algorithm like the usual process for adding whole numbers? *Sample answers: You start at the right. You add the smaller units and then the larger units. You trade if you need to.*

How is the mixed number addition algorithm different from the usual process for adding whole numbers? *Sample answers: You add whole numbers and fractions instead of tens and ones. When you trade, you trade 1 whole for fractional pieces instead of 1 ten for 10 ones. You trade after you finish the adding.*

Activity (B): Play Spin to Win

Use the game board to play Spin to Win. Model the problems with pattern blocks as needed.

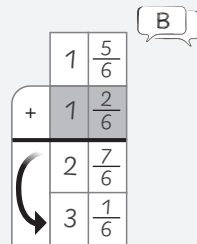
Spin to Win

Materials: Paper clip

Object of the Game: Win the most points.

Place one end of the paper clip in the middle of the top spinner. Place the point of a pencil through the paper clip so that it touches the very middle of the circle.

Spin to Win has 4 rounds. On your turn, hold the pencil upright and spin the paper clip so that it spins freely around the circle. Write the number from the left-hand spinner as the top addend in the first blank addition problem. Write the number from the right-hand spinner as the bottom addend in the problem. Then, add to find the sum. For example, if your first spin is $1\frac{5}{6}$ and your second spin is $1\frac{2}{6}$, your sum is $3\frac{1}{6}$.



Then, have the other player spin twice and find the sum of her spins. Whoever has the greater sum wins a point for that round.

Continue until you have completed 4 rounds. Whoever has won more points wins the game.

Independent Practice and Review

Have your child complete the Lesson 4.9 Practice and Review workbook page. If your child has trouble with any of the mixed number addition problems, encourage her to draw a sketch to match the problem.

Lesson 5.5

Mentally Divide Tens

Purpose	Materials
- Practice multiplying one-digit numbers by multiples of 10 - Use place-value thinking to divide multiples of 10 by one-digit numbers	- Play money - Paper clip
Memory Work	- What do we call an angle that looks like the corner of a piece of paper? <i>A right angle.</i> - What do we call a quadrilateral with 4 right angles? <i>A rectangle.</i> - What do we call a quadrilateral with 4 right angles and 4 equal sides? <i>A square.</i> - What do we call a quadrilateral with 4 equal sides? <i>A rhombus.</i>

Warm-up: Practice Multiplying by Multiples of 10

Have your child solve the following multiplication problems.

- $3 \times 20 = 60$
- $2 \times 40 = 80$
- $5 \times 20 = 100$
- $5 \times 30 = 150$
- $4 \times 50 = 200$

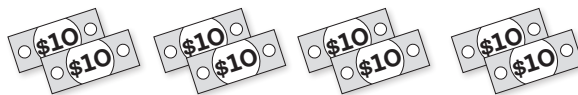
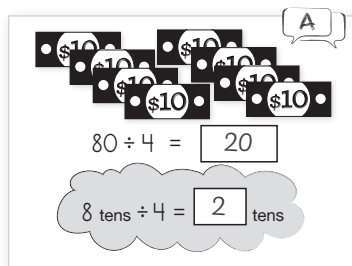
Remind your child to use place-value thinking to solve these problems. For example, for 5 times 30: 5 times 3 equals 15, so 5 times 3 tens equals 15 tens, or 150.

Activity (A): Use Place-Value Thinking to Mentally Divide Multiples of 10

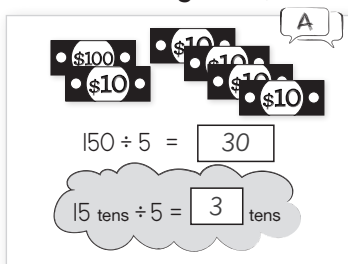
Today, you'll learn how to mentally divide multiples of 10 by one-digit numbers.

Place 8 ten-dollar bills on the table to match the picture. Let's pretend 4 friends did yard work and earned \$80 in all. They want to divide the money evenly.

We have 8 tens to split into 4 equal groups. What's 8 divided by 4? 2. Have your child split the 8 ten-dollar bills into 4 equal groups. 8 tens divided by 4 equals 2 tens. Write 2 in the cloud's blank. So, 80 divided by 4 equals 2 tens, or 20. Write 20 in the blank.

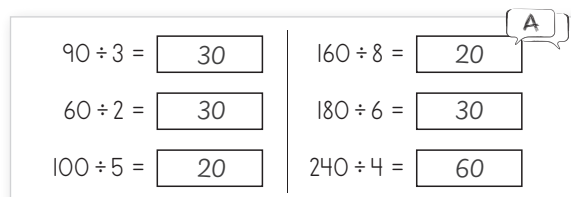


Now, let's pretend 5 friends do yard work and earn \$150 in all. \$150 equals 15 tens. What's 15 divided by 5? 3. 15 tens divided by 5 equals 3 tens. Write 5 in the cloud's blank. So, 150 divided by 5 equals 3 tens, or 30. Each friend gets \$30. Write 30 in the blank.



If your child has trouble understanding the problem, model \$150 with 15 ten-dollar bills and have her split the bills into 5 equal groups.

Have your child use this approach to solve the division problems in part A. Encourage her to use place-value thinking, and model the problems with ten-dollar bills as needed.

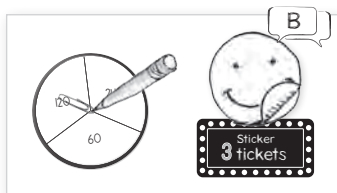


Activity (B): Use Division to Choose Prizes at the Mental Math Arcade

Let's pretend we're at the Mental Math Arcade again! This time, you'll spin the spinner to find how many tickets you win. Then, you choose a prize to buy with your tickets. You may only choose one type of prize per spin.

Before you spin, we'll discuss a few examples. Let's pretend I spin and win 120 tickets.

Place a paper clip on the spinner so that it points to 120. I decide to spend my tickets on stickers. Each sticker costs 3 tickets. How many stickers can I buy? 40. How do you know? 120 divided by 3 equals 40.



If your child has trouble keeping the numbers in her head, write the matching horizontal equation on a piece of scrap paper: $120 \div 3 = 40$.

Place one end of a paper clip in the middle of the spinner. Place the point of a pencil through the paper clip so that it touches the very middle of the circle. Then, have your child spin 5 times. After each spin, have her choose one prize to buy. Then, have her divide to find how many of the prize she can buy. For example, if she lands on 240 and wants to buy bouncy balls: 240 divided by 6 equals 40, so I would get 40 bouncy balls!

The lollipops (at 10 tickets apiece) preview dividing by multiples of 10. If your child has trouble with these questions, point out that she can use place-value thinking. For example, for $120 \div 10$: **120 equals 12 tens. There are 12 groups of 10 in 120, so 120 divided by 10 equals 12.** Your child will learn more about dividing by multiples of 10 in fifth grade.

Independent Practice and Review

Have your child complete the Lesson 5.5 Practice and Review workbook pages.

Lesson 7.3

Multiply Three-Digit Numbers by One-Digit Numbers

Purpose	Materials
- Practice multiplying one-digit numbers by multiples of 100 - Use the multiplication algorithm to multiply three-digit numbers by one-digit numbers	- Play money - Place-Value Chart (Blackline Master 4) - Colored pencils or markers 8 slips of paper
Memory Work	- What do we call the number to be divided? <i>The dividend.</i> - What do we call the number we divide by? <i>The divisor.</i> - What do we call the result when we divide two numbers? <i>The quotient.</i> - What do we call an amount that is left over after division? <i>The remainder.</i>

You will need 8 slips of paper to play Snowball Fight. Use white paper if you'd like the slips to look like snowflakes.

Warm-up: Practice Multiplying One-Digit Numbers by Multiples of 100

Have your child solve the following multiplication problems.

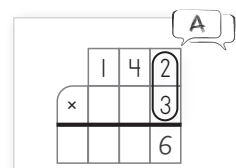
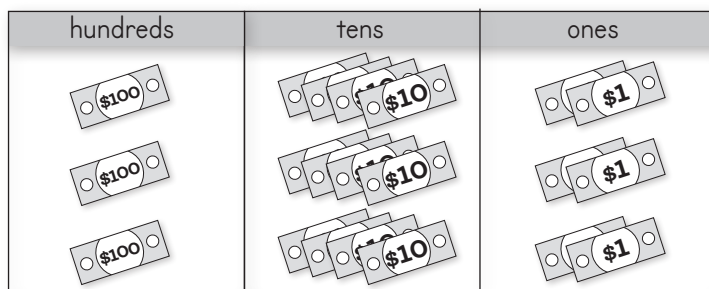
- 3 times 300. 900.
- 2 times 400. 800.
- 6 times 100. 600.
- 0 times 900. 0.
- 5 times 200. 1,000.
- 5 times 300. 1,500.
- 8 times 400. 3,200.

Activity (A): Multiply Three-Digit Numbers by One-Digit Numbers with the Multiplication Algorithm

In the last two lessons, you learned how to use the multiplication algorithm to multiply a two-digit number by a one-digit number. Today, you'll use the algorithm to multiply three-digit numbers by one-digit numbers. We'll follow the same steps.

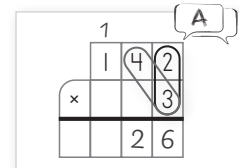
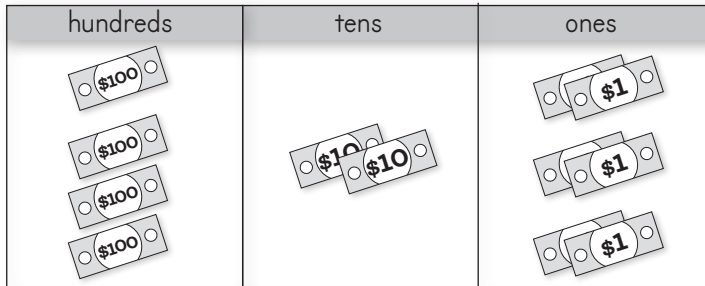
We'll pretend we work at a furniture store today. Our first customer would like 3 of these lamps. Each lamp costs \$142, so we'll multiply 3 times 142 to find the total cost. We'll use play money to model the problems today. Arrange play money as shown on the Place-Value Chart.

Which place do we start with? *The ones-place.* Use a colored pencil or marker to draw a ring around the 2 and 3 as shown. **What's 2 times 3?** 6. Write a 6 in the answer's ones-place.

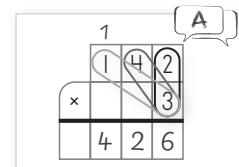
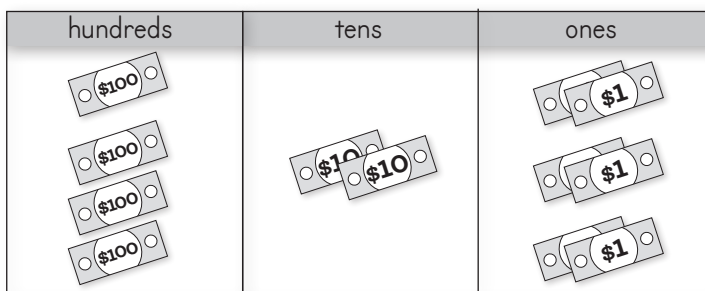


What do we do next? Multiply 4 tens by 3. Use a different colored pencil or marker to draw a ring around the 4 and 3 as shown. **What's 4 times 3?** 12. Trade 10 ten-dollar bills for 1 hundred-dollar bill, and place the hundred-dollar bill in the hundreds-column.

We added 1 hundred to the hundreds-place, so I write a 1 above the hundreds-place. Write a 1 above the hundreds-place. **There are 2 tens left in the tens-place, so I write a 2 in the tens-place.** Write a 2 in the answer's tens-place.



Last, we follow the same steps for the hundreds-place. Point to the hundred-dollar bills. Use a different colored pencil or marker to draw a ring around the 1 and 3 as shown. **We have 3 groups of 1 hundred.** **What's 1 times 3?** 3. **We have 1 extra hundred to add.** 3 plus 1 is 4, so there are a total of 4 hundreds. Write 4 in the answer's hundreds-place.



Have your child solve the rest of the problems in the same way. Model the problems with play money and draw rings around the digits as needed.

- For 470×2 , point out that your child should multiply the zero just as she multiplies any other number. **Zero times 2 is zero, so write a zero in the ones-place.**
- For 153×8 , remind your child that 10 hundreds equal 1 thousand. **12 hundreds equal 1 thousand and 2 hundreds. So, write a 1 in the answer's thousands-place and a 2 in the answer's hundreds-place.**

How much do 3 bookshelves cost?

\$286

	2	8	6
x			3
	8	5	8

How much do 2 armchairs cost?

\$470

	4	7	0
x			2
	9	4	0

How much do 8 chairs cost?

\$153

	1	5	3
x			8
	1	2	2

If your child often forgets to add the traded digits after she multiplies, have her cross out the traded digit after she adds it.



Activity (B): Play Snowball Fight

Play Snowball Fight.

If you'd rather avoid throwing, put the paper wads in a bowl and draw 2 wads each turn instead. Replace the wads in the bowl after each turn.

Snowball Fight

Materials: 8 slips of paper

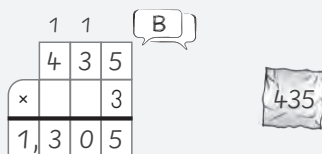
Object of the Game: Have the greater sum of all your products.

Write the numbers on the snowballs on separate slips of paper:



Crumple the slips of paper and place them on the table. Both players count down in unison from 10 while throwing the crumpled wads of paper at each other. When you reach 1, both players stop and pick up the closest wad of paper.

Both players unfold their paper wad and write their number in one of the blank grids on their scorecards. Both players multiply to find the product of the written number and printed number.



Sample play.

Crumple up your numbers and add them back to the pile of “snowballs.” Repeat until both players have filled in all of the blank grids. Each player adds up their products on a piece of scrap paper. Whoever has the greater total wins.

Independent Practice and Review

Have your child complete the Lesson 7.3 Practice and Review workbook pages.

Lesson 8.6

Add Angles with Pattern Blocks

Purpose	Materials
- Practice drawing angles with a protractor - Understand that you can add angles and their measures - Understand that there are multiple ways to split an angle into smaller angles	- Protractor - Pattern blocks
Memory Work	- What do we call an angle with a measure equal to 180 degrees? <i>Straight</i>. - What do we call an angle with a measure equal to 90 degrees? <i>Right</i>. - What do we call an angle with a measure less than 90 degrees? <i>Acute</i>. - What do we call an angle with a measure greater than 90 degrees and less than 180 degrees? <i>Obtuse</i>.

In this lesson, your child will put pattern blocks together to concretely add angles. He'll add angles more abstractly in the next lesson.

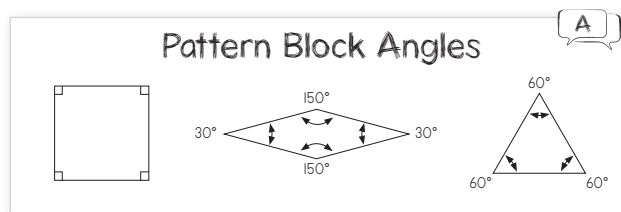
Warm-up: Draw Angles with a Protractor

Have your child use a protractor to draw the following angles on scrap paper: 25° , 60° , 125° , 90° . After your child draws each angle, have him tell whether it is acute, right, obtuse, or straight.

Activity (A): Use Pattern Blocks to Add Angles

In the last few lessons, you've learned how to measure angles with a protractor. Today, you'll learn how to add angles and use logical reasoning to find angles' measures without a protractor.

This chart shows the size of the angles in some of the pattern blocks. We'll use these pattern blocks to measure angles today.

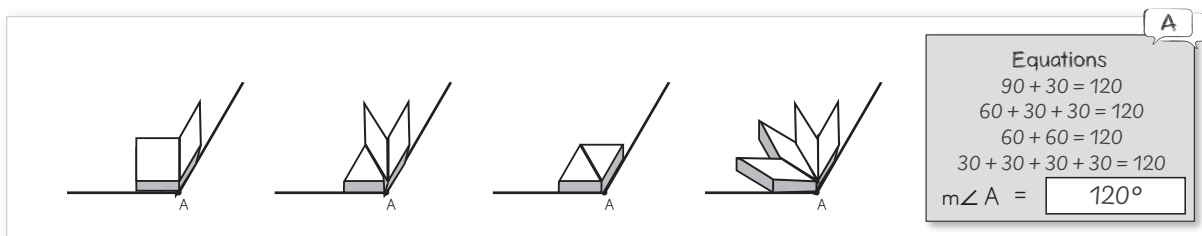


What do the little squares in the corner of the square pattern block mean? *The angles measure 90 degrees. They are right angles.* Which of the labeled angles has the greatest measure? *The 150-degree angle.* Which of the labeled angles has the smallest measure? *The 30-degree angle.*

Place a small pile of squares, narrow diamonds, and triangles on the table. You won't need the other types of pattern blocks.

Place a square and narrow diamond inside $\angle A$ as shown. **The square's angle measures 90 degrees. The narrow diamond's angle measures 30 degrees. So, what must angle A measure? 120 degrees.** If your child's not sure, suggest he add 90 plus 30. Write " $90 + 30 = 120$ " in the Equations box. Write 120° in the blank. Then, have your child measure the angle with a protractor to check.

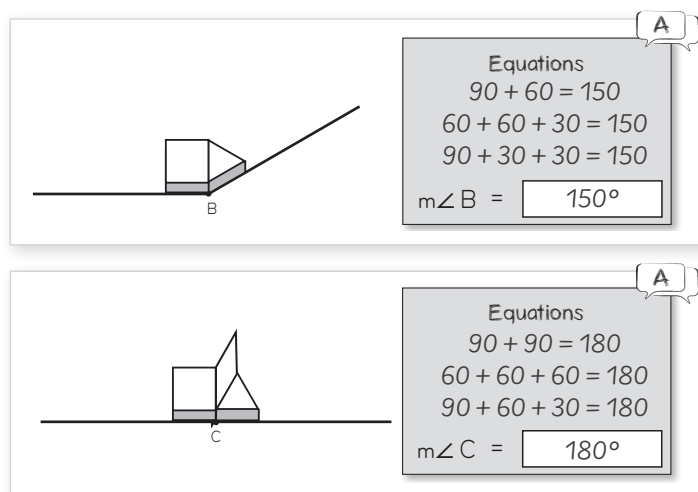
I wonder how many ways we could put pattern blocks inside angle A to show that it equals 120 degrees. Have your child experiment with the pattern blocks and find several other ways to fill in the 120° angle. Have him write an addition equation to match each arrangement.



All possible ways to create a 120° angle with the available pattern block angles.

Your child does not need to rearrange the numbers in the equations in multiple ways. For example, if he writes $60 + 30 + 30$, he does not need to also write $30 + 60 + 30$ and $30 + 30 + 60$.

Repeat for $\angle B$ and $\angle C$. Have your child find several different ways to fill each angle with the available pattern blocks and write an addition equation to match each arrangement. He does not need to find every possible way to fill each angle.



Sample answers. Your child may find other ways to fill the angles.

For $\angle B$, have your child use a protractor to check that he found the correct measure. For $\angle C$, ask: **How can you be sure that angle C is 180° without measuring it? Angle C is a straight angle, so it must measure 180° .**

Independent Practice and Review

Have your child complete the Lesson 8.6 Practice and Review workbook pages.

The purple triangle on the Practice page is not a standard pattern block. It is included to give your child experience with reasoning about 45° angles. These angles are created any time you cut a square along a diagonal, so they often come up in real-life contexts.

Lesson 10.7

Multiply and Add to Check Long Division

Purpose	Materials
- Practice dividing three-digit numbers by one-digit numbers with long division - Multiply and add to check division problems with a remainder - Solve division word problems and interpret remainders	Base-ten blocks, optional
Memory Work	- What's zero times any number? <i>Zero.</i> - What's zero divided by any other number? <i>Zero.</i> - What's any number divided by zero? <i>Undefined.</i>

If you find that your child doesn't have the stamina to complete this lesson in one session, split the lesson over two days:

- Day 1: Do the Warm-up, Activity A, and Activity B. Then, have your child complete the Review page only.
- Day 2: Review the problems in Activity B. Then, have your child complete the Practice page.

Warm-up (A): Practice Long Division

In the last lesson, you learned how to divide three-digit numbers by one-digit numbers. Let's warm up with some practice. Watch as I solve the first problem. Tap your pencil on the table each time I write a correct number. We'll do this completely silently so we can both concentrate.

If your child is not ready to solve these problems without help, skip the silent portion of this activity. Instead, use base-ten blocks to model the problems and verbally guide her through the steps (as in Lesson 10.6).

Slowly and deliberately solve the first long division problem. Your child should tap her pencil on the table after you write each number.

	3	8	2	
2	7	6	4	
-	6	↓		
	1	6		
-	1	6	↓	
		0	4	
	-		4	
			0	

Then, reverse roles for the other two problems. Have your child solve each problem. Tap your pencil on the table every time she writes a correct number. If she makes a mistake, do not tap the table. Instead, give her a puzzled look to prompt her to check her work.

	1	0	4			7	0
4	4	1	9	3	2	1	2
-	4	↓		-	2	1	↓
	0	1			0	2	
-		0	↓	-		0	
		1	9			2	
-		1	6				
			3				

Activity (B): Multiply and Add to Check Division Problems with a Remainder

In Unit 5, you learned how to multiply and add to check your answers for division problems with small numbers. Today, you'll learn how to multiply and add to check your answers for division problems with larger numbers. You'll also practice solving division word problems.

Read aloud the first word problem: *Two friends work together to earn \$764. They split the money equally. How much does each friend earn?* Which long division problem in part A matches this problem? 764 divided by 2.

764 divided by 2 equals 382. So, how much money does each friend earn? \$382. Write \$382 in the space below the problem.

Multiplication is the opposite of division, so we can use multiplication to check the answer. We want to make sure that 2 groups of 382 equal 764, so we multiply 382 times 2. Write 382×2 vertically in the blank grid. Have your child complete the multiplication problem. 382 times 2 equals 764, so 764 divided by 2 equals 382. Our answer is correct.

Two friends work together to earn \$764.
They split the money equally.
How much does each friend earn?

\$382

Check: →

		3	8	2
×				2
		7	6	4

Read aloud the next word problem: *A baker makes 419 cookies. She arranges the cookies on 4 trays and puts the same number of cookies on each tray. Which long division problem in part A matches this problem?* 419 divided by 4. 419 divided by 4 equals 104, with a remainder of 3.

This word problem has 2 questions. The first question is: *How many cookies are on each tray?* 104. Write "104 cookies" below the first question.

The second question is: *How many cookies are left over?* 3. Write "3 cookies" below the second question.

Let's use multiplication to check this answer. First, we'll multiply 104 times 4 to find the number of cookies on the trays. Write 104×4 vertically in the blank grid. Have your child complete the multiplication problem.

104 times 4 equals 416. There are 416 cookies on the trays. Now, we add on the 3 leftover cookies. Write a 3 below the ones-place in the problem. Write a plus sign and horizontal line. Have your child complete the addition problem. **104 times 4 plus 3 equals 419, so our answer is correct.**

A baker makes 419 cookies. She arranges the cookies on 4 trays and puts the same number of cookies on each tray.

- How many cookies are on each tray?
104 cookies
- How many cookies are left over?
3 cookies

Check:

			1	0	4
					4
				4	1
					6
					3
				4	1
					9

B

Have your child answer the final word problem (using the matching long division problem in part A). Then, have her multiply and add to check her answer.

A baker makes 212 muffins. He puts 3 muffins in each box.

- How many boxes does he fill?
70 boxes
- How many muffins are left over?
2 muffins

Check:

				7	0
					3
				2	1
					0
					2
				2	1
					2

B

Independent Practice and Review

Have your child complete the Lesson 10.7 Practice and Review workbook pages.

Lesson 11.1

Points, Rays, Lines, and Line Segments

Purpose	Materials
- Practice drawing angles with a protractor - Learn the definitions of points, rays, lines, and line segments - Label and draw points, rays, lines, and line segments	Protractor
Memory Work	- What do we call an angle with a measure less than 90 degrees? <i>Acute.</i> - What do we call an angle with a measure equal to 90 degrees? <i>Right.</i> - What do we call an angle with a measure greater than 90 degrees and less than 180 degrees? <i>Obtuse.</i> - What do we call an angle with a measure equal to 180 degrees? <i>Straight.</i>

Warm-up: Draw Angles with a Protractor

Have your child draw a 45° angle and a 160° angle on a piece of scrap paper. After your child draws each angle, have her tell whether it is acute, right, obtuse, or straight.

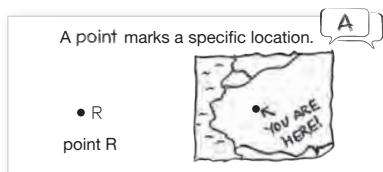


The 45° angle is acute. The 160° angle is obtuse.

Activity (A): Introduce Points, Lines, Line Segments, and Rays

We're starting a new unit on geometry today. In Unit 8, you learned about angles. In this unit, you'll learn how we put together lines and angles to make shapes. Today, you'll learn about the building blocks of shapes: points, lines, line segments, and rays.

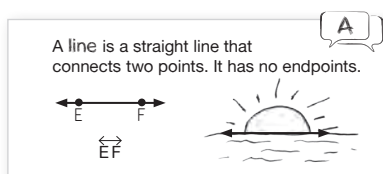
A *point* marks a specific location. This point is labeled with an R, so we call it "point R."



Point R marks a specific place on the paper, just like a "You are here" sign on a map tells you exactly where you are.

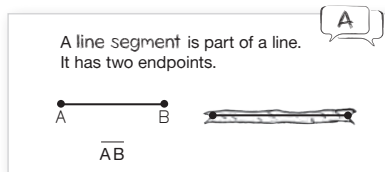
A *line* is a straight line that connects two points. It has no endpoints. Mathematicians imagine that lines continue forever in either direction, even though we can't really draw a line like that! Point to the arrows at either end of the line. The arrows remind us that the line continues beyond what's drawn on the page.

We use two points on the line to label it. This line connects points E and F, so we call it "line EF."



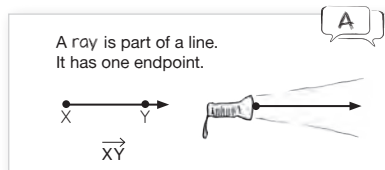
Have you ever watched the sun go down over the ocean? Or seen it in a picture or movie? *Answers will vary.* The horizon line between the ocean and sky is like a line in geometry. It's straight, and you can't see the end of it in either direction.

A **line segment** is part of a line. It has two endpoints. Point to the endpoints at either end of the line segment. We use the endpoints of the line segment to label it. The endpoints of this line segment are points A and B, so we call it "line segment AB."



A piece of ribbon is like a line segment. It's one part of a longer piece of ribbon, just like a line segment is one part of a longer line.

A **ray** is also part of a line. It has only one endpoint and continues forever in the other direction. We label rays with their endpoint and another point on the ray. This ray has point X as its endpoint, and it goes through point Y, so we call it "ray XY." Point to the arrow at the right end of the ray. The arrow reminds us that the ray continues beyond what's drawn on the page.

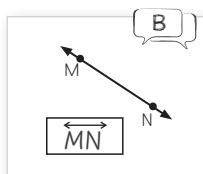


A flashlight is like a ray. The light begins at the flashlight and then extends in the other direction for a long way.

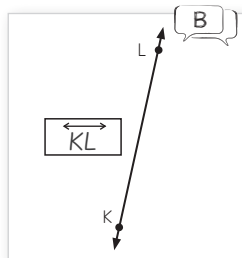
Activity (B): Label Lines, Line Segments, and Rays

Now, I'll show you how to label lines, line segments, and rays. Point to $\overleftrightarrow{MN}$. This line goes through points M and N, so first I write MN. Mathematicians always write capital letters when they label points. Write "MN" in the box below the line, with no space between the letters.

Then, I draw a line above the letters with two arrows. Draw a line above the letters with two arrows, as shown.



Can you find another line in part B? *Child points to $\overleftrightarrow{KL}$.* Have your child label this line in the same way.



Point to $\overline{IJ}$. This line segment ends at points I and J, so first I write IJ. Write "IJ" in the box below the line segment. Then, I draw a line segment symbol over the letters. Draw a line over the letters, as shown. The line segment symbol doesn't have arrows, since line segments don't continue forever.

Lesson 14.8

Enrichment (Optional)

Purpose	Materials
- Practice memory work - Understand how decimals help organize books at the library - Find the Dewey Decimal number for a favorite subject - Summarize what your child has learned and assess your child's progress	<i>The Efficient, Inventive (Often Annoying) Melvil Dewey</i>, written by Alexis O'Neill and illustrated by Edwin Fotheringham - Online access to your local library's catalog

Warm-up: Review Memory Work

Quiz your child on all memory work through Unit 14. See pages 536-537 for the full list.

Math Picture Book: *The Efficient, Inventive (Often Annoying) Melvil Dewey*

Read *The Efficient, Inventive (Often Annoying) Melvil Dewey*, written by Alexis O'Neill and illustrated by Edwin Fotheringham. After you read, discuss your child's experiences finding books at the library and using the Dewey Decimal System.

Enrichment Activity: Find the Dewey Decimal Number for Favorite Subjects

Many libraries use a system called the Dewey Decimal System to organize non-fiction books. All non-fiction books are put into one of 10 classes. Show your child the following list and read it aloud.

Dewey Decimal System

- 000:** Computer Science, Information, & General Works
- 100:** Philosophy & Psychology
- 200:** Religion
- 300:** Social Sciences
- 400:** Language
- 500:** Science
- 600:** Technology
- 700:** Arts & Recreation
- 800:** Literature
- 900:** History & Geography

Then, each class is divided further and further to make the categories more specific. For example, all books about owls are labeled 598.97. Each digit narrows down the category further. Show your child the following diagram. Have your child identify the new digit for each new subcategory.



The non-fiction books at many libraries are arranged in numerical order to match the Dewey Decimal System. That helps to find the book you want. You can go to any library that uses the Dewey Decimal System and know that the owl books will be at 598.97.

Have your child choose a non-fiction topic that he's interested in. Search for the topic in your local library's online catalog and find the Dewey Decimal number for the topic.

523.89
Constellations

Show your child how to use the Dewey Decimal number to find books on this topic the next time you go to the library. Discuss how knowing how to compare and order decimals helps you find the correct location.

Unit Wrap-Up

Have your child complete the Unit 14 Wrap-Up.

Unit 14 Checkpoint

What to Expect at the End of Unit 14

By the end of Unit 14, most children will be able to do the following:

- Read, write, and compare decimal numbers with tenths and hundredths. Some children will still have trouble comparing decimals with different numbers of digits or decimals with zeros in the tenths-place or hundredths-place.
- Understand place value in decimals and write decimals in expanded form.
- Express decimals as fractions or mixed numbers (with 10 or 100 as the denominator).
- Label decimals with tenths and hundredths on the number line.
- Round decimals to the nearest whole number.
- Express money amounts and metric lengths with decimals.
- Name decimal equivalents for $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$, and use these equivalents to compare decimals to these fractions.

Is Your Child Ready to Move on?

In Unit 15, your child will learn how to convert time, weight, and capacity units and solve problems involving these measurement units. Your child does not need to have mastered any specific skills before moving on to Unit 15.

Lesson 15.5

Weight Word Problems

Purpose	Materials
- Practice mental multiplication and division - Multiply grams and convert to kilograms - Solve word problems with kilograms and grams	2 dice
Memory Work	• How many grams equal 1 kilogram? 1,000.

Warm-up: Practice Mental Multiplication and Division

Have your child solve the following mental multiplication and division problems:

- $400 \times 7 = 2,800$
- $500 \times 6 = 3,000$
- $900 \times 8 = 7,200$
- $1,600 \div 2 = 800$
- $2,700 \div 3 = 900$
- $4,000 \div 8 = 500$

Activity (A): Multiply Grams at the Candy Store

In the last lesson, you added and subtracted kilograms and grams. Today, you'll learn to multiply and divide weights in kilograms and grams.

You're a lucky customer, because you've won a candy shopping spree! You get to roll 2 dice to find how many bags of each type of candy you get.

Have your child roll 2 dice. Write the sum of the numbers she rolls in the first blank in the chart. **Each bag of gummy bears weighs 200 grams. How many grams of gummy bears do you get?** *Sample answer (if your child rolls a 7): 1,400 grams. How do you know? Sample answer: I multiplied 7 times 200.*

Then, have your child convert the weight to kilograms and grams. Write both weights in the chart. For example, if your child rolled a 7, write "1,400 g" and "1 kg 400 g." Repeat with the rest of the types of candy.

		Weight (g)	Weight (kg and g)
Gummy bears	7 $\times 200$ g	1,400 g	1 kg 400 g
Gummy worms	5 $\times 500$ g	2,500 g	2 kg 500 g
Chocolate candies	10 $\times 400$ g	4,000 g	4 kg
Jelly beans	8 $\times 300$ g	2,400 g	2 kg 400 g

Sample chart. Your child's answers will vary based on the numbers she rolls.

Activity (B): Solve Addition and Subtraction Word Problems

Now, we'll solve some word problems about the candy you won in the shopping spree.

Read aloud the first word problem: **What is the total weight of the candy in kilograms and grams? How can we find the answer?** *Add up the weight of all the candy.*

To solve this problem, you could add up the weights in grams, or you could add up the weights in kilograms and grams. What units are you supposed to use for the answer? *Kilograms and grams.* So, let's add the weights in kilograms and grams so that the answer is already in the correct units. Help your child write and solve an addition problem to solve the problem.

What is the total weight of the candy in kilograms and grams? B

$$\begin{array}{r}
 1 \text{ kg } 400 \text{ g} \\
 2 \text{ kg } 500 \text{ g} \\
 4 \text{ kg} \\
 + 2 \text{ kg } 400 \text{ g} \\
 \hline
 9 \text{ kg } 1,300 \text{ g} \\
 \rightarrow 10 \text{ kg } 300 \text{ g}
 \end{array}$$

Sample problem. Use your child's answers from part A for the addends in the problem.

Read aloud the second problem: ***You eat 350 g of the gummy worms. What is the weight of the remaining gummy worms in grams? How can we find the answer? Subtract 350 grams from the total weight of the gummy worms. What units are you supposed to use for the answer? Grams. So, let's subtract the weights in grams so that the answer is already in the correct units.*** Help your child set up and solve a subtraction problem to find the answer.

You eat 350 g of the gummy worms. What is the weight of the remaining gummy worms in grams? B

$$2,500 - 350 = 2,150 \text{ g}$$

Sample answer.

Activity (C): Use Division to Solve Weight Word Problems

Read aloud the first word problem in part C: ***You split the jelly beans equally with a friend. How many grams of jelly beans do you each get? How can we find the answer? Divide the weight of the jelly beans by 2. What units are you supposed to use for the answer? Grams. So, let's divide the weight in grams by 2.*** Help your child write and solve a division equation to find the answer. Your child may use mental math or long division.

You split the jelly beans equally with a friend. How many grams of jelly beans do you each get? C

$$2,400 \text{ g} \div 2 = 1,200 \text{ g}$$

Sample answer.

Read aloud the last word problem: ***You divide the chocolate candies equally into 8 bags. How many grams of chocolate candies are in each bag? How can we find the answer? Divide the weight of the chocolate candies by 8. What units are you supposed to use for the answer? Grams. So, let's divide the weight in grams by 8.*** Help your child write and solve a division equation to find the answer. Your child may use mental math or long division.

You divide the chocolate candies equally into 8 bags. How many grams of chocolate candies are in each bag? C

$$4,000 \text{ g} \div 8 = 500 \text{ g}$$

Sample answer.

Independent Practice and Review

Have your child complete the Lesson 15.5 Practice and Review workbook pages.

Scope and Sequence

Unit	Objectives
Unit 1 Review	- Find answers for the multiplication and division facts (up to 10×10 and $100 \div 10$) - Solve multiplication and division word problems - Use long division to solve simple division problems with a remainder - Find multiples of a given number - Tell whether numbers are divisible by 2, 5, or 10 - Find all factors of a given number - Tell whether a given number is prime or composite
Unit 2 Place Value and Large Numbers	- Read, write, and compare numbers to one million - Understand place value to the millions-place and write large numbers in expanded form - Round three- and four-digit numbers to any place - Round large numbers to the nearest thousand - Use place-value thinking to mentally add and subtract thousands - Use the addition and subtraction algorithms to add and subtract five- and six-digit numbers - Solve multi-step addition and subtraction word problems with large numbers
Unit 3 Mental Multiplication	- Mentally multiply one-digit numbers by a multiple of 10, 100, or 1,000 (e.g., 4×500 or $3,000 \times 6$) - Mentally multiply a multiple of 10 by a multiple of 10 (e.g., 40×80) - Write and solve expressions with parentheses - Understand the distributive property and use it to solve problems - Find answers for the $\times 11$ and $\times 12$ facts - Use the area model and box method to multiply two-digit numbers by one-digit numbers - Solve multiplication word problems, including multiplicative comparison problems and multi-step problems
Unit 4 Fractions and Mixed Numbers	- Identify and compare fractions and mixed numbers on the number line - Convert whole numbers and mixed numbers to fractions - Convert fractions to mixed numbers or whole numbers - Multiply fractions by whole numbers - Add and subtract fractions and mixed numbers with the same denominator
Unit 5 Mental Division	- Solve division word problems and interpret remainders depending on the context - Use multiplication (and addition) to check answers to division problems - Find answers for the $\div 11$ and $\div 12$ facts - Mentally divide multiples of 10, 100, or 1,000 (for example, $60 \div 3$ or $3,000 \div 5$)

Unit	Objectives
Unit 6 Area and Perimeter	• Use correct units to calculate perimeter and area • Find the perimeter of shapes with straight sides and understand how to use multiplication to add sides with equal lengths more efficiently • Understand how to split shapes composed of rectangles into parts and add or subtract to find total area • Write equations with parentheses to find perimeter or area • Solve multi-step perimeter and area word problems
Unit 7 Written Multiplication, Part 1	• Understand the steps in the written multiplication algorithm and model them with base-ten blocks or play money • Multiply a two-, three-, or four-digit number by a one-digit number • Use multi-digit multiplication to solve word problems • Use multi-digit multiplication to find area or perimeter
Unit 8 Angles	• Estimate angle measures in degrees • Identify acute, right, obtuse, and straight angles • Measure angles with a protractor • Draw angles with a given measure • Add or subtract to find the measure of an unknown angle
Unit 9 Length	• Convert length measurements within the U.S. customary system (inches, feet, yards, and miles) • Add and subtract feet and inches • Convert length measurements within the metric system (millimeters, centimeters, meters, and kilometers) • Measure with a ruler in centimeters and millimeters • Add and subtract compound units in the metric system • Solve two-step word problems that involve converting units
Unit 10 Long Division	• Use long division to solve division problems (up to four digits divided by one digit) • Use multiplication (and addition) to check answers to division problems • Use long division to solve word problems
Unit 11 Geometry	• Identify and label points, rays, lines, and line segments • Identify parallel, perpendicular, and intersecting lines • Identify, construct, and draw trapezoids, parallelograms, squares, rectangles, and rhombuses • Identify and draw right triangles, obtuse triangles, and acute triangles • Find lines of symmetry in triangles and quadrilaterals

Unit	Objectives
Unit 12 Equivalent Fractions	• Multiply the numerator and denominator of a fraction by the same number to create an equivalent fraction • Find missing numerators or denominators in pairs of equivalent fractions • Use equivalent fractions to identify and compare fractions of an inch or fractions of a meter • Use common denominators to compare fractions with different denominators
Unit 13 Written Multiplication, Part 2	• Multiply two-digit numbers by two-digit numbers with the box method • Multiply two-digit numbers by two-digit numbers with the traditional written algorithm • Multiply two-digit numbers to solve word problems
Unit 14 Decimals	• Read, write, and compare decimal numbers to the hundredths-place • Understand place value in decimals and write decimals in expanded form • Express decimals as fractions or mixed numbers • Identify decimals on the number line and round decimals to the nearest whole number • Express money amounts and metric lengths with decimals • Name decimal equivalents for common fractions
Unit 15 Time, Weight, and Capacity	• Convert units of time (days, hours, minutes, seconds) • Convert weight and capacity measurements within the metric system (kilograms, grams, liters, milliliters) • Convert weight and capacity measurements within the U.S. customary system (pounds, ounces, gallons, quarts, pints, cups, fluid ounces) • Add and subtract compound units for time, weight, and capacity • Solve two-step word problems that involve converting time, weight, and capacity units
Unit 16 Line Plots and Averages	• Create line plots with whole number or fractional increments • Interpret line plots • Find the average for a small data set

Materials List

What You'll Need in Your Math Kit

You'll use the following materials regularly in *Fourth Grade Math with Confidence*. Stash them in a box or basket and always keep them ready for your next lesson. (See pages 8-9 in the Introduction for more detailed descriptions of each item.)

- 40 small counters (20 each of 2 different colors)
- Play money (20 one-dollar bills, 20 ten-dollar bills, 10 hundred-dollar bills)
- Pattern blocks
- Base-ten blocks (20 unit blocks, 20 rods, and 10 flats)
- 1-foot (or 30-centimeter) ruler
- Protractor
- 2 packs of playing cards and 2 dice
- Blank paper
- Pencils

Other Supplies

Besides your Math Kit, you'll also need the following household items. You'll only need most of them once or twice, so you don't need to gather them ahead of time or store them separately. Check the unit overviews for the specific household items you'll need for each unit.

Items marked with an asterisk are needed for the optional enrichment lessons at the end of each unit.

- Colored pencils or markers
- Slips of paper (approximately 100 over the course of the year)
- Tape
- 2 paper clips
- Scissors
- *Pan of brownies or sheet cake, optional
- 6 dice
- *Almanac or internet access
- *Large piece of posterboard (or 9 sheets of paper and tape)
- *Recipe with mixed numbers and fractions
- *4 pieces of yarn of different colors, each 36 inches long
- *Wooden stick, about 1 foot long
- 8 toothpicks, craft sticks, or straws
- Large piece of paper (at least 12 inches by 12 inches)
- Yardstick, optional
- Meterstick, optional
- *2 pieces of centimeter graph paper
- *Calculator or calculator app
- Tape measure marked in feet and inches (at least 10 feet long)
- Tape measure marked in meters and centimeters, or knowledge of your child's height (in either meters and centimeters or feet and inches)
- *Cardboard strip, about 1 in. wide and 3 ft. long (or 3 cm wide and 1 m long)
- *Nutrition labels for several different types of cookies or crackers
- 4 craft sticks or narrow strips of paper
- *Paper square, approximately 6 inches by 6 inches
- *Pushpin
- *5 different colors of paper

- *Small bowl or cup (for tracing)
- *Glue, optional
- Body temperature thermometer, either digital or analog
- Digital stopwatch or stopwatch app
- *Online access to your local library's catalog
- Object that weighs about 1 kilogram, such as a pair of adult shoes, a pineapple, or this (printed) Instructor Guide, optional
- Object that weighs about 1 gram, such as a paper clip or thumbtack
- 1-liter container (such as a large water bottle or measuring cup), optional
- Eyedropper, optional
- Object that weighs about 1 pound, such as a loaf of bread, can of vegetables, or box of pasta, optional
- Object that weighs about 1 ounce, such as a slice of bread, AA battery, or a stack of 5 quarters, optional
- Container that holds 1 fluid ounce, such as a bottle of vanilla or other flavor extract, optional
- 1-cup measuring cup, optional
- *Your child's usual drinking glass
- *Water
- *If you use *U.S. customary units*: measuring cup marked in fluid ounces
- *If you use *metric units*: measuring cup marked in milliliters