

Unit 3: Multi-Digit Division

4th Grade Math

35 Class Meetings

Written December 2024

Essential Questions

- What does it mean to divide a number, and how is division related to multiplication?
- How can breaking a problem into smaller parts help us solve multi-digit division problems?
- What is a remainder, and what does it represent in a division problem?

Enduring Understandings with Unit Goals

EU 1: Division is a mathematical operation that allows us to break a number into equal groups or find how many groups are needed.

- Explain how division is used to divide a total into equal groups or determine how many groups can be made.
- Solve division problems involving equal groups, arrays, and repeated subtraction.
- Use models, diagrams, and equations to represent and solve division problems involving equal groups.
- Multiply 10, 100, and 1,000 by one- and two-digit numbers.

EU 2: Remainders represent what is left over after equal groups are made and have real-world implications depending on the context.

- Solve division word problems within 100 that involve a remainder.
- Check the work of a division calculation by multiplying the quotient and divisor and adding the remainder to see if it equals the dividend.
- Determine what to do with a remainder based on the word problem.

EU 3: Understanding how to extract relevant details from word problems involving division is essential for creating a mathematical equation to solve it.

- Solve two-step word problems involving division, multiplication, addition, and subtraction.
- Interpret the remainder in the context of the word problem.
- Determine when to discard the remainder in a word problem.
- Determine if the answer should be forced to the next highest whole number in a word problem.
- Determine if the remainder should remain part of the answer to the word problem.

Standards

Common Core State Standards:

- **CCSS.Math.4.MD.A.3:** Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
- **CCSS.Math.4.NBT.B.6:** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
- **CCSS.Math.4.OA.A.3:** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown

Unit 3: Multi-Digit Division

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quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

- **CCSS.Math.4.OA.C.5:** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
- **CCSS.Math.4.NBT.A.1:** Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.
- **CCSS.Math.4.NBT.B.4:** Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- **CCSS.Math.4.NBT.B.5:** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Understanding and Interpreting Remainders

- Understand that a remainder is the number left over when one number is divided by another.
- Solve division word problems within 100 that involve a remainder, using an array, an area model, or a tape diagram to represent the problem.
- Check the solution to division problems using inverse operations, multiplying the quotient with the dividend and adding the remainder.
- Understand that the units of the quotient and remainder are different, since the quotient represents either the number of groups or the size of the groups, but the remainder represents what remains of the whole.

2. Division of up to Four-Digit Whole Numbers by One-Digit Whole Numbers

- Explain the value of digits in multi-digit numbers.
- Divide multiples of 10, 100, and 1,000 by single digits using concrete and pictorial base ten blocks.
- Divide multiples of 10, 100, and 1,000 by single digits by solving in unit form.
- Divide two-, three-, and four-digit numbers by one-digit numbers using a variety of mental strategies including finding partial quotients and adding them together and adjusting the dividend to a compatible or “friendly” number and adjusting from there.

Unit 3: Multi-Digit Division

4th Grade Math

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3. Multi-Step Word Problems and Patterns

- Apply various strategies like array models commutative, associative, and distributive properties to multiply multi-digit by multi-digit problems.
- Identify and solve real-world scenarios where dividing into equal groups is necessary.
- Communicate reasoning and solution methods for how problems were solved.
- Identify patterns in division of multiples of 10, 100, and 1,000 by single digits.

Vocabulary and Key Terms: division, dividend, divisor, quotient, remainder, equal groups, place value, estimation, partial quotients, long division, inverse operation, factor, multiple, array, algorithm, estimate, divide evenly, grouping, reasonableness

Interdisciplinary Connection:

- ELA

Daily Learning Objectives with TWPS

Students will be able to...

- Solve division word problems with remainders.
 - *Kristy has 22 roses to sell. She arranges 6 roses in each vase. How could you represent this problem with an array?*
- Solve division word problems that require the interpretation of the remainder. **
 - *Ms. Vigorito's math class is starting group projects. There are 21 students in Ms. Vigorito's class. They are split into groups of 4 students. How many groups of 4 students will there be? How many remaining students will there be?*
 - *Solve the following problems. What are the main differences between each one.*
 - a. A teacher has 21 batteries. Each calculator uses 4 batteries. How many calculators can the teacher fill with batteries?*
 - b. Four children can ride in a car. How many cars are needed to take 21 children to the museum?*
 - c. Ms. Cole wants to share 21 pieces of candy with 4 students. If Ms. Cole gets to eat the pieces of candy that can't be split evenly, how many pieces of candy will Ms. Cole get?*
- Divide multiples of 10, 100, and 1,000 by one-digit numbers.
 - *Mr. Janssen buys a plant at a gardening center. A flower blooms on the plant every seventh day. How many flowers are on his plant after 25 days?*
- Divide two-, three-, and four-digit numbers by one-digit numbers using a variety of mental strategies. **
 - *Starbursts come in packages of 10. Mr. Duffy has 3 packages of Starburst that he wants to share evenly with Ms. Glynn. How many Starbursts will they each get?*
 - *Cayman says that $59 \div 4$ is 10 with a remainder of 19. He reasons this is correct because $(4 \times 10) + 19 = 59$. What mistake has Cayman made? Explain how he can correct his work.*
- Solve two-digit dividend division problems with no remainder or a remainder in the ones place with smaller divisors and quotients.
 - *When a certain number is divided by 5, the quotient is 16 with a remainder of 2. What is the number?*
- Solve two-digit dividend division problems with a remainder in the tens and/or one's place with smaller divisors and quotients. *

Unit 3: Multi-Digit Division

4th Grade Math

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- *Ms. Roll is making a mural using square tiles. She has 96 tiles and wants the mural to be 8 tiles tall. a. How many tiles long will Ms. Roll's mural be? b. Write one or more equations to show how you solved this problem.*
- *Ivy has 5 times as many stickers as Adrian has. Ivy has 85 stickers. How many stickers does Adrian have?*
- Solve two-digit dividend division problems with a remainder in any place with larger divisors and quotients.
 - *Ms. Needham squeezed 85 ounces of orange juice. She wants to pour it into glasses that hold 6 ounces each. How many glasses will Ms. Needham need to hold all the juice?*
- Solve three-digit dividend division problems with a remainder in any place. **
 - *Jefe has 63 cookies. He wants to put 2 cookies in a bag to sell them. He's only going to sell completely full bags. How many bags can he sell?*
 - *Molly has a total of 95 pieces of candy to share with her two friends. Any pieces they can't share evenly they'll give to Molly's mom. How many pieces of candy will Molly's mom get?*
- Solve four-digit dividend division problems with a remainder in any place. **
 - *Talia used 672 charms to make key chains for the school fair. She used 7 charms for each key chain she made. What was the total number of key chains Talia made for the school fair?*
 - *Zach filled 581 one-liter bottles with apple cider. He distributed the bottles to 4 stores. Each store received the same number of bottles. Zach kept the leftover bottles to be distributed the next day. How many bottles did Zach keep?*
- Solve two-, three-, and four-digit dividend problems, including the special cases of having a 0 in the quotient or dividend, and assess the reasonableness of the quotient. **
 - *There are 1,456 students at Sedgwick Middle School. For field day, the principal splits them into groups of 6. How many teams of 6 can they make? How many more students would they need to make another team of 6?*
 - *Marty wants to put lights around his deck. The deck has a perimeter of 1,828 feet. Each string of lights is 5 feet long. How many strings of lights will Marty have to buy?*
- Solve two-step word problems involving all four operations, including those involving interpreting the remainder.
 - *Write a division problem that has no zero in the dividend, or whole, but has a zero in the quotient. Explain how you determined your answer.*
- Solve multi-step word problems involving all four operations.
 - *Edris wants to build a rectangular garden in his backyard to grow vegetables. He buys 60 yards of fencing to put around the garden to keep the animals out. He wants the garden to be 12 feet long. What should the width of his garden be so that he uses all the fencing he bought?*
- Identify and extend growing number patterns.
 - *Now Edris wants to retiling the rectangular patio in his backyard. He uses 128 tiles that are each one square foot. His patio is 8 feet wide. He wants to edge the patio with metal tape to make sure the tiles don't move or shift at all. How many feet of metal tape should Edris buy?*
- Identify and extend growing shape patterns.
 - *A group of 6 people at an elementary school gave a total of \$1,890 to a town to fix up a playground. Each person gave the same amount. At a middle school, 5 people each gave*

Unit 3: Multi-Digit Division
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\$280 to the same town. How much more did each person at the elementary school give than each person at the middle school?

- Identify and extend repeating shape patterns.
 - *A truck delivers 32 cases of soup to a store. Each case holds 8 cans of soup. The store manager plans to place 9 cans on each shelf. What is the fewest number of shelves the manager will need for all the cans of soup delivered by the truck?*

Instructional Strategies/Differentiated Instruction

- Whole group instruction
- Paragraph frames and sentence starters
- Teacher modeling
- Think-write-pair-share and small-group discussions
- Graphic organizers
- Accountable talk
- Homework
- Word walls with visuals
- Small group instruction
- Visual exemplars with teacher and student critiques
- Text and video chunking
- Spiraling back to guiding questions

EL Differentiation Strategies

- Word Banks and Word Walls with visuals
- TWPS (Think, write, pair, share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit teacher modeling
- Key vocabulary
- Graphic organizers
- Strategic Grouping
- Non-verbal assessments

Assessments

FORMATIVE ASSESSMENTS:

- Do Now
- Academic Discourse
- Exit Slips
- Accountable Talk Discussions
- Completed notes
- Homework
- Performance Task -- “Lemonade Stand” Performance Task
 - Teacher’s rubric/scoring guide

SUMMATIVE ASSESSMENTS:

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| <ul style="list-style-type: none">● Quiz: Dividing Multi-Digit Numbers, Dividing with Remainders, Dividing in Word Problems (EU1, EU2, and EU3)● IAB● Unit Task: “Pizza Party” Performance Task (EU1, EU2 and EU3) |
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Unit Task

<p>Unit Task Name: “Pizza Party” Performance Task</p>
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<p>Description: Each student is responsible for planning a pizza party for the class. They must calculate how much pizza to buy and how many pieces each student would receive. They then must determine what to do with leftover pieces of pizza based on how many are left. Finally, they will need to determine the price of the pizzas and how to split it among their classmates.</p>

<p>Evaluation: Teacher’s Scoring Guide</p>

Unit Resources

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| <ul style="list-style-type: none">● Google Classroom● Pear Assessment● Math In Focus● Math Antics● State Common Core Standards Transition Tasks● Match Fishtank● Worksheets● Individual White boards● Interactive notebook● Laptops● SBAC Prep Online |
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