

Unit 2: Powerful Products and Dynamic Dividends

5th Grade Math

20 Class Meetings

Written July 2025

Essential Questions

- What strategies can be used to multiply large numbers accurately and efficiently?
- How can place value and multiplication help divide large numbers?
- How do parentheses, brackets, and braces affect the way I solve numerical expressions?

Enduring Understandings with Unit Goals

EU 1: The value of numbers and place value patterns can be used to multiply and divide multi-digit numbers efficiently and accurately.

- Fluently multiply multi-digit whole numbers using the standard algorithm.
- Divide whole numbers with up to four-digit dividends and two-digit divisors using strategies based on place value and multiplication.
- Use and explain models (area models, arrays, equations) to represent and solve division problems.

EU 2: Mathematical expressions can be written, interpreted, and evaluated using symbols and structures to show relationships and order of operations.

- Use parentheses, brackets, and braces in numerical expressions.
- Evaluate expressions by following the correct order of operations.
- Recognize how grouping symbols affect the outcome of an expression.

EU 3: Expressions can represent calculations and mathematical relationships without needing to be solved.

- Write numerical expressions to match verbal descriptions of calculations.
- Interpret expressions and explain the relationships between their parts without solving them.
- Compare expressions and identify how the structure affects their values.

Standards

Common Core State Standards:

- **CCSS.5.NBT.B.5:** Fluently multiply multi-digit whole numbers using the standard algorithm.
- **CCSS.5.NBT.B.6:** Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.5.OA.A.1:** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
- **CCSS.5.OA.A.2:** Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.
- **CCSS.5.NBT.A.2:** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a

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decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

- **CCSS.5.NBT.A.1:** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $1/10$ of what it represents in the place to its left.
- **CCSS.4.NBT.B.4:** Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- **CCSS.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.
- **CCSS.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.3.OA.D.8:** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
- **CCSS.4.OA.A.3:** Solve multi-step problems posed with whole numbers and have 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 quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

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

- **Multiply and Divide Multi-Digit Numbers**
 - Develop fluency with multi-digit multiplication and division.
 - Learn to multiply using the standard algorithm.
 - Apply place value understanding to break apart numbers, estimate, and solve problems efficiently.
 - Use partial quotients, area models, and the relationship between multiplication and division to divide up to two, two-digit numbers.
 - Solve problems with four-digit dividends and two-digit divisors, explaining their reasoning through visual models and equations.

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- **Write, Interpret, and Evaluate Mathematical Expressions**
 - Introduce numerical expressions that use parentheses, brackets, and braces.
 - Explore the order of operations and how grouping symbols affect the way expressions are evaluated.
 - Learn to accurately solve multi-step expressions.
 - Develop an understanding of how expressions represent real-world or mathematical situations and how precise language, and structure are essential in communicating mathematical thinking.
- **Calculations and Mathematical Relationships**
 - Interpret mathematical expressions.
 - Write expressions based on verbal descriptions.
 - Identify patterns or relationships within expressions without calculating the final answer.
 - Analyze the structure of expressions, identify how values relate to each other, and use comparative reasoning to discuss expression size and structure.

Vocabulary and Key Terms: factor, product, multiplication, standard algorithm, partial products, estimate, dividend, divisor, quotient, remainder, partial quotient, area model, array, compatible numbers, place value, regroup, equation, numerical expressions, expression, parentheses (), brackets [], braces { }, grouping symbols, order of operations, evaluate, operation, equation, sum, difference, product, quotient, compare, relationship, pattern, interpret

Interdisciplinary Connection:

- ELA

Daily Learning Objectives with *TWPS*

Students will be able to...

- Identify and explain the place value of digits in multi-digit whole numbers.
 - *How is the value of the digit 7 different in the numbers 7,432 and 74,321?*
- Estimate products of multi-digit numbers using place value and rounding.
 - *Why might estimating be helpful before solving a multiplication problem like 394×78 ?*
- Multiply a 2-digit number by a 2-digit number using the area model.
 - *How does the area model show the distributive property in action?*
- Use partial products to multiply multi-digit numbers.
 - *Explain why $36 \times 24 = (30 + 6) \times (20 + 4)$ is helpful to break down the problem.*
- Multiply multi-digit numbers using the standard algorithm.
 - *Compare your answer to 427×36 using the standard algorithm vs. partial products. Which method was more efficient and why?*
- Estimate quotients using rounding and compatible numbers.
 - *If you estimate $2,145 \div 32$ as $2,100 \div 30$, what does that tell you about your answer before solving?*
- Use place value and repeated subtraction to divide with two-digit divisors.
 - *How can breaking a division problem into smaller parts help you solve it without a calculator?*
- Use area models and partial quotients to divide a 3- or 4-digit number by a two-digit number.
 - *Use an area model to solve $1,248 \div 26$ and explain your thinking to a partner.*
- Use the standard algorithm for division and interpret remainders.

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- *In a word problem, how do you decide what to do with a remainder—keep it, round it, or ignore it?*
- Solve multi-step word problems involving multiplication and division.
 - *A school orders 14 boxes of pencils. Each box has 48 pencils. If 336 pencils are given to classrooms, how many are left?*
- Recognize and explain the use of grouping symbols: parentheses, brackets, and braces.
 - *How does the placement of parentheses change the result of $8 + 3 \times 4$ compared to $(8 + 3) \times 4$?*
- Apply the order of operations to evaluate expressions without grouping symbols.
 - *Why is it important to multiply and divide before adding and subtracting in an expression?*
- Evaluate expressions with parentheses and nested grouping symbols.
 - *Solve and explain: $6 \times [4 + (3 + 2)]$. What do the grouping symbols tell you to do first?*
- Compare and interpret expressions with different structures.
 - *Compare the expressions $5 \times (4 + 6)$ and $5 \times 4 + 6$. Which one is greater and why?*
- Create expressions that match a word problem using proper grouping and operations.
 - *Write an expression for: "Add 15 and 9, then multiply by 4." How would this look with grouping symbols?*
- Write numerical expressions to represent verbal statements.
 - *What clues in the phrase "multiply the sum of 12 and 8 by 3" help you build the expression correctly?*
- Interpret expressions without solving them, focusing on structure.
 - *Without solving, describe what $3 \times (15 + 12)$ represents and how it's different from $(3 \times 15) + 12$.*
- Recognize patterns in expressions and reason about relationships.
 - *Explain how $5 \times (200 + 40)$ relates to 1,200. What reasoning can you use without solving?*
- Compare numerical expressions and explain reasoning without computation.
 - *Which expression is greater: $2 \times (50 + 25)$ or $3 \times (30 + 15)$? How can you tell without solving?*
- Write and explain multiple expressions that represent the same situation.
 - *A student buys 3 notebooks for \$5 each and 2 folders for \$2 each. Write two different expressions to represent the total cost and explain how they're related.*

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

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- 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 -- “Backpack Business” Performance Task
 - Teacher’s rubric/scoring guide

SUMMATIVE ASSESSMENTS:

- Quiz: Multiply and Divide Multi-Digit Numbers, Write, Interpret, and Evaluate Mathematical Expressions, Calculations and Mathematical Relationships (EU1, EU2, and EU3)
- IAB
- Unit Task: “Backpack Business” Performance Task (EU1, EU2 and EU3)

Unit Task

Unit Task Name: “Backpack Business” Performance Task

Description: Upon completion of the unit students will be asked to independently apply their understanding of multi-digit multiplication, division, and numerical expressions to a realistic, math-rich context: managing a startup business that assembles and ships custom school supply kits. Students will take on the role of a math and logistics expert for a school supply company. Their responsibilities include: calculating totals of supplies across large orders using multiplication strategies (area models, standard algorithm, partial products), solving real-world division problems using multiple strategies and interpreting remainders appropriately, and writing and interpreting numerical expressions involving grouping symbols to model costs and logistical scenarios. Finally, they will explain their mathematical thinking and constructing context-based word problems to deepen their conceptual understanding.

Evaluation: Teacher’s Scoring Guide

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Unit Resources

- 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