

## Common Core State Standards Whole Number and Decimal Operations

**Outcomes:**

- ❑ Participants will multiply and divide whole numbers and decimals word problems using a variety of tools and strategies. They will compare the skills and concepts that students need to use with tool to complete the operation to understand the types of scaffolding that students might need to build meaning of the operation with a specific size of number. .

**Agenda**

- Whole number and decimal multiplication
- Whole number and decimal division division
- Comparison of strategies and tools
- Instructional Planning

**My Reflection on Fractions:**

**Standards that Impact Student Achievement for Grades 4-6**

Standards that Impact Student Achievement for Grades 4-6						
Grade 4	Numbers and Base Ten			Numbers and Fractions		
	4.NBT.4 Add and subtract to 100,000	4.NBT.5 Multiply 4-digit x 1-digit and 2-digit x 2-digit	4.NBT.6 Division including <b><i>understanding remainders</i></b>	4.NF.1 Equivalent fractions	4.NF.3 Addition and subtraction of fractions <b><i>including word problems.</i></b>	4.NF.4 Multiplication of fractions
Grade 5	Numbers and Base Ten		Numbers and Fractions		Measurement	
	5.NBT.1 Powers of 10 and our place value system	5.NBT.6 Division up to 4-digit by 2-digit (equations, arrays, area model)	5.NF.2 <b><u>Word problems</u></b> involving addition and subtraction of fractions.	5.NF.3 Interpret a fraction as a division problem and <b><i>solve problems</i></b> leading to a fractional quotient	5.MD.5 Concept of volume	
Grade 6	Ratios and Proportions	Number Sense	Equations and Expressions		Statistics and Probability	
	6.RP.3 Use ratio and rate reasoning to <b><u>solve real-world and mathematical problems</u></b>	6.NS.5 Understand that positive and negative values are opposites <b><u>and use to represent real-world context.</u></b>	6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers. <b>6.EE.3 and 4</b> Use properties of find equivalent expressions/Identify when two expressions are equivalent	6.EE.7 and 6.EE.8 <b><u>Solve real-world problems</u></b> by writing and solving equations: Write inequalities to represent a constraint or problem. Represent solutions on a number line.	6.SP.3 Understand what a measure of center vs a measure of variability	

**My Notes:**

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Whole Number Multiplication

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Decimal Multiplication

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Whole Number Division

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Decimal Division

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## Building Understanding of Multiplication and Division of Whole Numbers

Multiplication and division are built from concepts. Teaching algorithms without connections to concepts such as place value creates misunderstandings. We see this as students confuse procedures and make errors in place value.

Build understanding by:

- Using context to discuss the problem

- Encourage estimating a reasonable solution before computing

- Allow for various ways to solve the problem

- With decimal, end with a discussion about the placement of the decimal point

Operation	Tools	Strategies
Multiplication	place value chart, place value chips, graph paper	Place value, area, partial products, expanded notation form, traditional algorithm
Division	place value chart, place value chips, graph paper, toolbox of facts	Place value, area, partial quotients, traditional algorithm

## AREA for Multiplication

A bakery shop is making batches of muffins. They make \_\_\_\_\_ muffins in a batch. Today they will make \_\_\_\_\_ batches of muffins. How many muffins will they have to sell?

Problem 1:  $74 \times 4$

Problem 2:  $234 \times 3$

Problem 3:  $452 \times 63$

Solve each problem in at least two different ways. How do the numbers in the first method show up in the second method? Where are they if they don't show up?

Each container of chocolate muffins weighs 0.43 pounds. Each container of zucchini muffins weighs 0.423 pounds. Use this to create problem 4 and problem 5. Solve each one using at least two different methods.

What is Problem 4?  $2 \times 0.43$

What is problem 5?  $4 \times 0.423$

Additional Problems to Try: Pr.6:  $1.6 \times 1.2 =$  Pr.7:  $1.3 \times 0.8$  Pr. 8:  $1.2 \times 0.3$

## Patterns with Multiplication

- What happens when you multiply a tenth by a tenth?
- What happens when a tenth is multiplied by a whole number?
- What happens when a tenth is multiplied by a hundredth?

*Sentence Frame: When you multiply a number by a factor \_\_\_\_\_ 1, the product will be \_\_\_\_\_ than the original number.*

**Part A:** Find the product of each of these problems. What pattern do you notice? Will this always be true?

$$33 \times 10 =$$

$$3.3 \times 10 =$$

$$3.3 \times 1 =$$

$$3.3 \times 0.1 =$$

**Part B:** Use one of the phrases below to complete each sentence.

a bit bigger than      a lot more than      a bit less than      a lot less than.

1.  $3.4 \times 0.998$  is \_\_\_\_\_ than 3.4
2.  $0.04 \times 1.0895$  is \_\_\_\_\_ than 0.04
3.  $12,780 \times 0.0098$  is \_\_\_\_\_ than 12,780
4.  $0.002 \times 0.900093$  is \_\_\_\_\_ than 0.002
5.  $12.678 \times 1850.09$  is \_\_\_\_\_ than 12.678

**Part C.** What is the best approximate answer to each problem and explain why you chose it.

1.  $12.078 \times 0.49601 \approx$       A) 6      B) 60      C) 600      D) 6000
2.  $11.897 \times 0.0981 \approx$       A) 12      B) 1.2      C) 0.12      D) 0.012
3.  $0.089 \times 1.000237 \approx$       A) 0.009      B) 0.09      C) 0.9      D) 9
4.  $0.7 \times 0.049 \approx$       A) 35      B) 3.5      C) 0.35      D) 0.035
5.  $45.1 \times 101.00 \approx$       A) 45,000      B) 4,500      C) 450      D) 45

## Division in Context

- There are 655 acres to be shared by 5 siblings. If each sibling receives that same amount of land, how many acres will each one receive?

Try:  $655 \div 5$

Try:  $745 \div 3$

## Estimating Quotients

What numbers can you think about to help you divide the following problems?

Problem 1:  $712 \div 94 =$

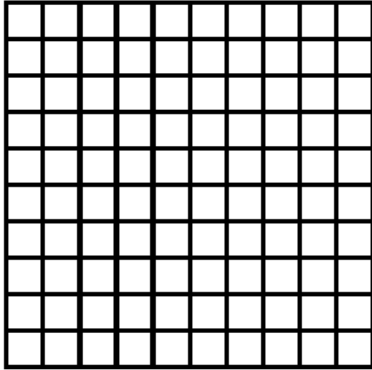
Problem 2:  $4,289 \div 52 =$

<p>a.</p> $617 \div 23$  $\approx$ _____ $\div$ _____  $=$ _____	<p>b.</p> $559 \div 11$  $\approx$ _____ $\div$ _____  $=$ _____
<p>c.</p> $6,523 \div 21$  $\approx$ _____ $\div$ _____  $=$ _____	<p>d.</p> $3,704 \div 53$  $\approx$ _____ $\div$ _____  $=$ _____

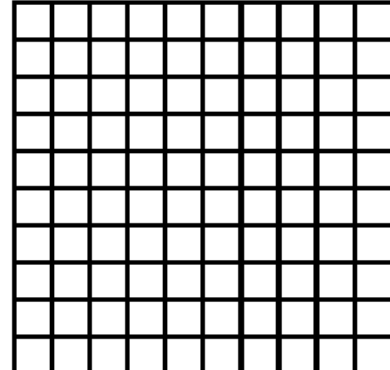
## Division with Decimals

**Part A:** How do you show division of decimal divisors using an area?

$$1.0 \div 0.2 =$$



$$0.75 \div 0.25 =$$



**Part B:** How do you show division of decimal divisors using a number line?

You have a **2-meter** length of ribbon. You are making bows that require **0.4 meters** of ribbon. How many ribbons can you make if you use all the ribbon?

Divide:  $2 \div 0.4 =$

Divide  $4 \div 0.2 =$

**Part C:** How do you show division of decimal divisors using place value blocks?

A small ketchup container holds 0.24 ounces. How many small containers will fit into a bottle that holds 0.72 ounces?

Divide:  $0.72 \div 0.24 =$

Divide  $4.2 \div 0.6 =$

## Patterns with Division

- What happens when a tenth is divided by a whole number?
- What happens when a hundredth is divided by a whole number?
- What happens when you divide a tenth by a tenth?
- What happens when you divide a tenth by a hundredth?

*Sentence Frame:* When the divisor \_\_\_\_\_ 1, the quotient will be \_\_\_\_\_ than the original number.

**Part A:** Find the product of each of these problems. What pattern do you notice? Will this always be true?

$67 \div 10 =$

$67 \div 1 =$

$67 \div 0.1 =$

$67 \div 0.01 =$

$2.4 \div 10 =$

$2.4 \div 1 =$

$2.4 \div 0.1 =$

$2.4 \div 0.01 =$

**Part B:** Use one of the phrases below to complete each sentence.

a bit bigger than      a lot more than      a bit less than      a lot less than.

6.  $3.4 \div 0.998$  is \_\_\_\_\_ than 3.4

7.  $0.04 \div 1.0895$  is \_\_\_\_\_ than 0.04

8.  $12,780 \div 0.0098$  is \_\_\_\_\_ than 12,780

9.  $0.002 \div 0.900093$  is \_\_\_\_\_ than 0.002

10.  $12.678 \times 1850.09$  is \_\_\_\_\_ than 12.678

**Part C.** What is the best approximate answer to each problem and explain why you chose it.

6.  $12.078 \div 0.49601 \approx$       A) 24      B) 240      C) 2400      D) 24,000

7.  $11.897 \div 0.0981 \approx$       A) 12      B) 120      C) 1200      D) 12,000

8.  $0.089 \div 1.000237 \approx$       A) 0.009      B) 0.09      C) 0.9      D) 9

9.  $0.7 \div 0.049 \approx$       A) 140      B) 14      C) 1.4      D)

0.14

10.  $45.1 \div 101.00 \approx$       A) 450      B) 45      C) 4.5      D)

0.45

## Number Sense of Decimals

In each problem, the digits for each calculation are given. Write the solution including the decimal point. Where does the decimal go? How do you know?

1.	$169 \div 0.4 = 4\ 2\ 2\ 5$	
2.	$1.69 \div 4 = 4\ 2\ 2\ 5$	
3.	$16.9 \div 0.4 = 4\ 2\ 2\ 5$	
4.	$16.9 \div 0.8 =$	
5.	$2.45 \times 3.15 = 7\ 7\ 1\ 7\ 5$	
6.	$24.5 \times 3.15 = 7\ 7\ 1\ 7\ 5$	
7.	$0.245 \times 3.15 = 7\ 7\ 1\ 7\ 5$	
8.	$20.9964 \div 9.36 = 2\ 2\ 4\ 3\ 2\ 0\ 5$	
9.	$209.964 \div 9.36 = 2\ 2\ 4\ 3\ 2\ 0\ 5$	
10.	$209.964 \div 0.936 = 2\ 2\ 4\ 3\ 2\ 0\ 5$	

## Problem Solving with Decimals

- Kenny is ordering uniforms for both the girls' and boys' tennis clubs. He is ordering shirts for 43 players and two coaches at a total cost of \$658.35. Additionally, he is ordering visors for each player at a total cost of \$368.51. How much will each player pay for the shirt and visor?