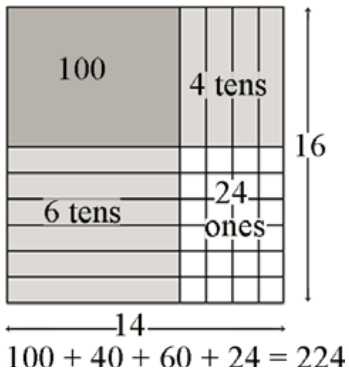
<table>
<tr><td>Grade: 4

Unit 4- Division of Whole Numbers using Decimals</td><td colspan="2">Subject: Math
Time Frame: 20 days
Domains: Number and Operations in Base Ten, Operations and Algebraic Thinking, and Measurement and Data</td></tr>
<tr><td>Standards</td><td>Content Standards:
4.NBT.4, 4.NBT.5, 4.NBT.6, 4.OA.1, 4.OA.2, 4.OA.3, 4.OA.4, 4.OA.5,
http://www.corestandards.org/wp-content/uploads/Math_Standards.pdf</td><td>Practice Standards:
MP 1, 2, 3, 4, 5, 6, 7, 8</td></tr>
<tr><td>Enduring Understandings</td><td colspan="2">1. Equations can be written to represent problems with more than one step.
2. A multiplication equation can be interpreted as a comparison of two quantities and how they relate to each other.
3. Multi-step word problems can be solved by determining the operation needed to solve the problem.
4. Once determined, an equation can be written to represent the unknown quantity.
5. Mental computation and estimation strategies can be used to determine the reasonableness of the answer.</td></tr>
<tr><td>Essential Questions</td><td colspan="2">1. How can we represent an unknown quantity in an equation?
2. What is the difference between an expression and an equation?
3. How do we determine what operations to use to solve any problem?
4. How can you use inverse operations to write comparison equations?
5. How can you use equations to solve multi-step word problems?
6. How can you generate or extend a number or shape pattern?</td></tr>
<tr><td>Vocabulary</td><td colspan="2">expression, equation, simplify, term, evaluate, sum, difference, situation equation, solution equation, factor pair, compare, comparison bars, comparison situations, pictograph, prime number, composite number, multiple, pattern</td></tr>
</table>

Priority and Supporting CCSS	Explanations and Examples*
4.NBT.4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.	**4.NBT.4.** Students build on their understanding of addition and subtraction, their use of place value and their flexibility with multiple strategies to make sense of the standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract. When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works. 3892 + 1567 Student explanation for this problem: 1. Two ones plus seven ones is nine ones. 2. Nine tens plus six tens is 15 tens. 3. I am going to write down five tens and think of the10 tens as one more hundred.(notates with a 1 above the hundreds column) 4. Eight hundreds plus five hundreds plus the extra hundred from adding the tens is 14 hundreds. 5. I am going to write the four hundreds and think of the 10 hundreds as one more 1000. (notates with a 1 above the thousands column) 6. Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand. 3546 - 928 Student explanation for this problem is on next page:

*Source – Connecticut Core Standards for Mathematics as adapted from the Arizona Academic Content Standards

	1. There are not enough ones to take 8 ones from 6 ones so I have to use one ten as 10 ones. Now I have 3 tens and 16 ones. (Marks through the 4 and notates with a 3 above the 4 and writes a 1 above the ones column to be represented as 16 ones.) 2. Sixteen ones minus 8 ones is 8 ones. (Writes an 8 in the ones column of answer.) 3. Three tens minus 2 tens is one ten. (Writes a 1 in the tens column of answer.) 4. There are not enough hundreds to take 9 hundreds from 5 hundreds so I have to use one thousand as 10 hundreds. (Marks through the 3 and notates with a 2 above it. (Writes down a 1 above the hundreds column.) Now I have 2 thousand and 15 hundreds. 5. Fifteen hundreds minus 9 hundreds is 6 hundreds. (Writes a 6 in the hundreds column of the answer). 6. I have 2 thousands left since I did not have to take away any thousands. (Writes 2 in the thousands place of answer.) Note: Students should know that it is mathematically possible to subtract a larger number from a smaller number but that their work with whole numbers does not allow this as the difference would result in a negative number.

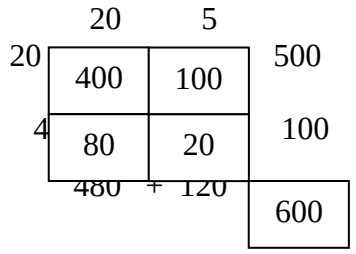
Priority and Supporting CCSS	Explanations and Examples*
4.NBT.5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. * * Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.	**4.NBT.5**. Students who develop flexibility in breaking numbers apart have a better understanding of the importance of place value and the Distributive Property in multi-digit multiplication. Students use base ten blocks, area models, partitioning, compensation strategies, etc. when multiplying whole numbers and use words and diagrams to explain their thinking. They use the terms factor and product when communicating their reasoning. Multiple strategies enable students to develop fluency with multiplication and transfer that understanding to division. Use of the standard algorithm for multiplication is an expectation in the 5th grade. Students may use digital tools to express their ideas. Use of place value and the Distributive Property are applied in the scaffolded examples below. • To illustrate 154 x 6 students use base 10 blocks or use drawings to show 154 six times. Seeing 154 six times will lead them to understand the Distributive Property, 154 x 6 = (100 + 50 + 4) x 6 = (100 x 6) + (50 x 6) + (4 x 6) = 600 + 300 + 24 = 924. • The area model shows the partial products. 14 × 16 = 224  100 + 40 + 60 + 24 = 224 Using the area model, students first verbalize their understanding: • 10 × 10 is 100 • 4 × 10 is 40 • 10 × 6 is 60, and • 4 × 6 is 24. They used different strategies to record this type of thinking.

- Students explain this strategy and the one below with base 10 blocks, drawings, or numbers.

  25
  × 24
  400 (20 × 20)
  100 (20 × 5)
  80 (4 × 20)
  20 (4 × 5)
  600

- 25
  × 24
  500 (20 × 25)
  100 (4 × 25)
  600

- Matrix model: This model should be introduced after students have facility with the strategies shown above.



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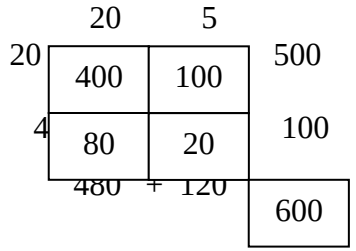
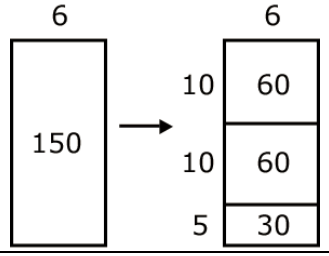


Priority and Supporting CCSS	Explanations and Examples*
4.NBT.6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. * * Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.	**4.NBT.6** In fourth grade, students build on their third grade work with division within 100. Students need opportunities to develop their understandings by using problems in and out of context. Examples: A 4th grade teacher bought 4 new pencil boxes. She has 260 pencils. She wants to put the pencils in the boxes so that each box has the same number of pencils. How many pencils will there be in each box? • Using Base 10 Blocks: Students build 260 with base 10 blocks and distribute them into 4 equal groups. Some students may need to trade the 2 hundreds for tens but others may easily recognize that 200 divided by 4 is 50. • Using Place Value**:** 260 ÷ 4 = (200 ÷ 4) + (60 ÷ 4) • Using Multiplication**:** 4 x 50 = 200, 4 x 10 = 40, 4 x 5 = 20; 50 + 10 + 5 = 65; so 260 ÷ 4 = 65 • Using an Open Array or Area Model After developing an understanding of using arrays to divide, students begin to use a more abstract model for division. This model connects to a recording process that will be formalized in the 5th grade. Example 1: 150 ÷ 6 Students make a rectangle and write 6 on one of its sides. They express their understanding that they need to think of the rectangle as representing total of 150. 

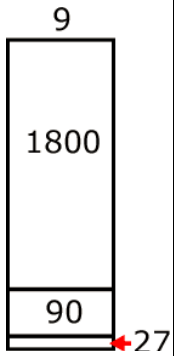
[Example 1: 150 ÷ 6]

1. Students think, 6 times what number is close to 150? They recognize that 6 × 10 is 60, so they record 10 as a factor and partition the rectangle into 2 rectangles and label the area aligned to the factor of 10 with 60. They express that they have only used 60 of the 150, so they have 90 left.
2. Recognizing that there is another 60 in what is left, they repeat the process above. They express that they have used 120 of the 150, so they have 30 left.
3. Knowing that 6 × 5 is 30, they write 30 in the bottom area of the rectangle and record 5 as a factor.
4. Students express their calculation in various ways:
   a. 150 — 150 ÷ 6 = 10 + 10 + 5 = 25
   - 60 (6 × 10)
   90
   - 60 (6 × 10)
   30
   - 30 (6 × 5)
   0

   b. 150 ÷ 6 = (60 ÷ 6) + (60 ÷ 6) + (30 ÷ 6)
   = 10 + 10 + 5 = 25

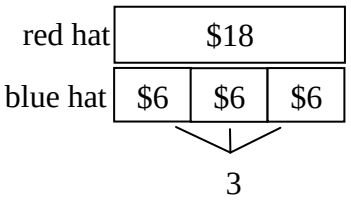
Example 2: 1917 ÷ 9

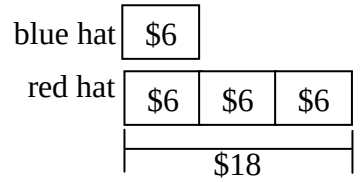
A student's description of his or her thinking may be: I need to find out how many 9s are in 1917. I know that 200 × 9 is 1800. So if I use 1800 of the 1917, I have 117 left. I know that 9 × 10 is 90. So if I have 10 more 9s, I will have 27 left. I can make 3 more 9s. I have 200 nines, 10 nines and 3 nines. So I made 213 nines. 1917 ÷ 9 = 213.



Students may use digital tools to express ideas.

Priority and Supporting CCSS	Explanations and Examples*
4.OA.1. Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	**4.OA.1**. A *multiplicative comparison* is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., "*a* is *n* times as much as *b*"). Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times.

Priority and Supporting CCSS	Explanations and Examples*
4.OA.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.	**4.OA.2.** Students need many opportunities to solve contextual problems. Table 2 in the glossary included the following multiplication problem: "A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?" In solving this problem, the student should identify $6 as the quantity that is being multiplied by 3. The student should write the problem using a symbol to represent the unknown. ($6 × 3 = __) 

	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? In solving this problem, the student should identify $18 as the quantity being divided into shares of $6. The student should write the problem using a symbol to represent the unknown. ($18 ÷ $6 = __)  When distinguishing multiplicative comparison from additive comparison, students should note that • additive comparisons focus on the difference between two quantities (e.g., Deb has 3 apples and Karen has 5 apples. How many more apples does Karen have?). A simple way to remember this is, "How many more?" • multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times larger or smaller than the other (e.g., Deb ran 3 miles. Karen ran 5 times as many miles as Deb. How many miles did Karen run?). A simple way to remember this is "How many times as much?" or "How many times as many?"

Priority and Supporting CCSS	Explanations and Examples*
4.OA.3. Solve multi-step 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 quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**4.OA.3.** Students need many opportunities solving multistep story problems using all four operations. An interactive whiteboard, document camera, drawings, words, numbers, and/or objects may be used to help solve story problems. Example: Chris bought clothes for school. She bought 3 shirts for $12 each and a skirt for $15. How much money did Chris spend on her new school clothes? $3 \times \$12 + \$15 = \_\_$ In division problems, the remainder is the whole number left over when as large a multiple of the divisor as possible has been subtracted. Example: Kim is making candy bags. There will be 5 pieces of candy in each bag. She had 53 pieces of candy. She ate 14 pieces of candy. How many candy bags can Kim make now? (7 bags with 4 leftover) Kim has 28 cookies. She wants to share them equally between herself and 3 friends. How many cookies will each person get? (7 cookies each) $28 \div 4 = \_\_$ There are 29 students in one class and 28 students in another class going on a field trip. Each car can hold 5 students. How many cars are needed to get all the students to the field trip? (12 cars, one possible explanation is 11 cars holding 5 students and the 12th holding the remaining 2 students) $29 + 28 = 11 \times 5 + 2$ Estimation skills include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate

	method of estimation, and verifying solutions or determining the reasonableness of situations using various estimation strategies. Estimation strategies include, but are not limited to: • front-end estimation with adjusting (using the highest place value and estimating from the front end, making adjustments to the estimate by taking into account the remaining amounts) • clustering around an average (when the values are close together an average value is selected and multiplied by the number of values to determine an estimate) • rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding affected the original values) • using friendly or compatible numbers such as factors (students seek to fit numbers together - e.g., rounding to factors and grouping numbers together that have round sums like 100 or 1000), • using benchmark numbers that are easy to compute (students select close whole numbers for fractions or decimals to determine an estimate)

Priority and Supporting CCSS	Explanations and Examples*
4.OA.4. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.	**4.OA.4.** Students should understand the process of finding factor pairs so they can do this for any number 1 -100, not just those within the basic multiplication facts. Example: Factor pairs for 96: 1 and 96, 2 and 48, 3 and 32, 4 and 24, 6 and 16, 8 and 12. Multiples can be thought of as the result of skip counting by each of the factors. When skip counting, students should be able to identify the number of factors counted e.g., 5, 10, 15, 20 (there are 4 fives in 20). Example: Factors of 24: 1, 2, 3, 4, 6, 8,12, 24 Multiples : 1,2,3,4,5…24 2,4,6,8,10,12,14,16,18,20,22,24 3,6,9,12,15,18,21,24 4,8,12,16,20,24 8,16,24 12,24 24 To determine if a number between 1-100 is a multiple of a given one-digit number, some helpful hints include the following: • all even numbers are multiples of 2 • all even numbers that can be halved twice (with a whole number result) are multiples of 4 • all numbers ending in 0 or 5 are multiples of 5 Prime vs. Composite: A prime number is a number greater than 1 that has only 2 factors, 1 and itself.

	Composite numbers have more than 2 factors. Students investigate whether numbers are prime or composite by • building rectangles (arrays) with the given area and finding which numbers have more than two rectangles (e.g. 7 can be made into only 2 rectangles, 1 x 7 and 7 x 1, therefore it is a prime number) • finding factors of the number

Priority and Supporting CCSS	Explanations and Examples*
4.OA.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. ***For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.***	**4.OA.5**. Patterns involving numbers or symbols either repeat or grow. Students need multiple opportunities creating and extending number and shape patterns. Numerical patterns allow students to reinforce facts and develop fluency with operations. Patterns and rules are related. A pattern is a sequence that repeats the same process over and over. A rule dictates what that process will look like. Students investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features.

Examples:

Pattern	Rule	Feature(s)
3, 8, 13, 18, 23, 28, …	Start with 3, add 5	The numbers alternately end with a 3 or 8
5, 10, 15, 20…	Start with 5, add 5	The numbers are multiples of 5 and end with either 0 or 5. The numbers that end with 5 are products of 5 and an odd number. The numbers that end in 0 are products of 5 and an even number.

After students have identified rules and features from patterns, they need to generate a numerical or shape pattern from a given rule.

Example:

Rule: Starting at 1, create a pattern that starts at 1 and multiplies each number by 3. Stop when you have 6 numbers.

Students write 1, 3, 9, 27, 81, 243. Students notice that all the numbers are odd and that the sums of the digits of the 2 digit numbers are each 9. Some students might investigate this beyond 6 numbers. Another feature to investigate is the patterns in the differences of the numbers (3 - 1 = 2, 9 - 3 = 6, 27 - 9 = 18, etc.)

Priority and Supporting CCSS	Explanations and Examples*
4.MD.2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	**4.MD.2.** Examples: Division/fractions: Susan has 2 feet of ribbon. She wants to give her ribbon to her 3 best friends so each friend gets the same amount. How much ribbon will each friend get? Students may record their solutions using fractions or inches. (The answer would be 2/3 of a foot or 8 inches. Students are able to express the answer in inches because they understand that 1/3 of a foot is 4 inches and 2/3 of a foot is 2 groups of 1/3.) Addition: Mason ran for an hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran? Subtraction: A pound of apples costs $1.20. Rachel bought a pound and a half of apples. If she gave the clerk a $5.00 bill, how much change will she get back? Multiplication: Mario and his 2 brothers are selling lemonade. Mario brought one and a half liters, Javier brought 2 liters, and Ernesto brought 450 milliliters. How many total milliliters of lemonade did the boys have? Number line diagrams that feature a measurement scale can represent measurement quantities. Examples include: ruler, diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a volume measure on the side of a container.

Resources
Math Expressions Unit 4 , Lessons 1-12 Thinkcentral.com Soar to Success Math Intervention Mega Math Common Core Mathematics- Newmark Learning Book- Units- 1 & 4 Xtramath.org Learnzillion.com Mobymax.com

Unit Assessments
Unit Test Quick Quizzes Formative Assessments Performance Task Assessment from other sources: https://grade4commoncoremath.wikispaces.hcpss.org/Assessing+4.NBT.4 https://grade4commoncoremath.wikispaces.hcpss.org/4.NBT.5 https://grade4commoncoremath.wikispaces.hcpss.org/4.NBT.6 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.1 https://grade4commoncoremath.wikispaces.hcpss.org/Assessing+4.OA.2 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.3 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.4

Technology: Videos, Websites, Links
http://elemmath.jordandistrict.org/teachers/4thgrade/ https://grade4commoncoremath.wikispaces.hcpss.org/4.NBT.4 https://grade4commoncoremath.wikispaces.hcpss.org/4.NBT.5 https://grade4commoncoremath.wikispaces.hcpss.org/4.NBT.6 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.1 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.2 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.3 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.4 https://grade4commoncoremath.wikispaces.hcpss.org/4.OA.5 http://www.mathworksheetsland.com/