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

Unit 2-- Operations and Algebraic Thinking using Whole Numbers with Multiplication</td><td colspan="2">Subject: Math
Time Frame: 30 days
Domains: Number and Operations in Base Ten, Measurement and Data, Operations and Algebraic Thinking</td></tr>
<tr><td>Standards</td><td>Content Standards:
4.NBT.1, 4.NBT.2, 4.NBT3., 4.NBT.5, 4.MD.2,4.OA.3
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. Drawing arrays and area diagrams to represent multiplication helps you to solve multiplicative comparison problems.
2. Some real world problems can be solved using multiplication
3. You can use the multiplication algorithm to solve multiplication problems.</td></tr>
<tr><td>Essential Questions</td><td colspan="2">1. What strategies can be used to multiply whole numbers?
2. How can you use patterns in multiplication with ones, tens, and hundreds?
3. How can multiplication problems be represented by area models?
4. When can estimation be useful in solving multiplication problems?
5. How are the Distributive Property and multiplication related?
6. When can multiplication be used to solve real world problems?
7. How can different strategies be used to multiply multi-digit numbers?
8. When is regrouping needed in multiplication?</td></tr>
<tr><td>Vocabulary</td><td colspan="2">place value sections method, expanded notation method, algebraic notation method, shortcut method, array, area, area model, square unit, factor, product, estimate, rounding, partial products</td></tr>
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Priority and Supporting CCSS	Explanations and Examples*
4.NBT.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 ÷ 70 = 10 by applying concepts of place value and division.* * * Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.	**4.NBT.1.** Students should be familiar with and use place value as they work with numbers. Some activities that will help students develop understanding of this standard are: • Investigate the product of 10 and any number, then justify why the number now has a 0 at the end. (7 x 10 = 70 because 70 represents 7 tens and no ones, 10 x 35 = 350 because the 3 in 350 represents 3 hundreds, which is 10 times as much as 3 tens, and the 5 represents 5 tens, which is 10 times as much as 5 ones.) While students can easily see the pattern of adding a 0 at the end of a number when multiplying by 10, they need to be able to justify why this works. • Investigate the pattern, 6, 60, 600, 6,000, 60,000, 600,000 by dividing each number by the previous number.

Priority and Supporting CCSS	Explanations and Examples*
4. NBT.2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. * * Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.	**4.NBT.2.** The expanded form of 275 is 200 + 70 + 5. Students use place value to compare numbers. For example, in comparing 34,570 and 34,192, a student might say, both numbers have the same value of 10,000s and the same value of 1000s; however, the value in the 100s place is different so that is where I would compare the two numbers.

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

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)

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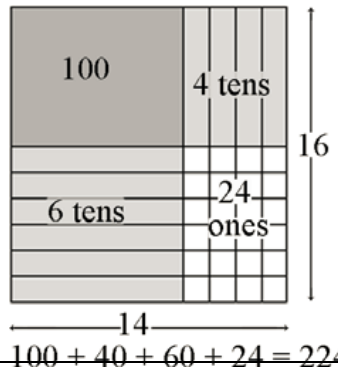
4.NBT.3. Use place value understanding to round multi-digit whole numbers to any place. [*] [*] Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.	**4.NBT.3**. When students are asked to round large numbers, they first need to identify which digit is in the appropriate place. Example: Round 76,398 to the nearest 1000. • Step 1: Since I need to round to the nearest 1000, then the answer is either 76,000 or 77,000. • Step 2: I know that the halfway point between these two numbers is 76,500. • Step 3: I see that 76,398 is between 76,000 and 76,500. • Step 4: Therefore, the rounded number would be 76,000.

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** Example with addition and subtraction: <u>Addition</u>: 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? <u>Subtraction</u>: 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? 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.

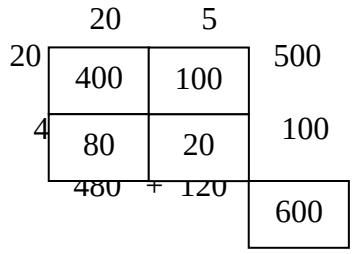
4.NBT.5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.* * Grade 4 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.



Resources
Math Expressions – Unit 2, Lessons 1-19 Soar to Success Math Intervention Mega Math Destination Math Common Core Mathematics-Newmark Learning- Units-Unit3,8,9,10 Xtramath.org Thinkcentral.com Learnzillion Mobymax.com

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

Technology: Videos, Websites, Links
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