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| **Prerequisite Skills**  **(Grade 4)** | **Unit One Standards**  **Grade 5** | **Looking Ahead**  **(Grade 6)** |
| 3rd grade – initial instruction of Order of Operations | Operations and Algebraic Thinking 1: Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.   * I can evaluate expressions using the order of operations using symbols. * I can place parenthesis and brackets in expressions. | Write and evaluate numerical expressions involving whole-number exponents. |
| Represent problems with equations and use variables to stand for the unknown quantity.  Interpret a multiplication equation as a comparison (35 is 5 times as many as 7) | Operations and Algebraic Thinking 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 × (8 + 7).* *Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921,* *without having to calculate the indicated sum or product.*   * I can write numerical expressions with operation words. * I can interpret numerical expressions without evaluating them. | Write, read and evaluate expressions in which letters stand for numbers.  Apply the properties of operations to generate equivalent expressions.  Identify when two expressions are equivalent. (y + y + y = 3y)  Use variables to represent numbers and write expressions. |
| Students developed understanding of multiplication through using various strategies. While the standard algorithm is mentioned, alternative strategies are also appropriate to help students develop conceptual understanding. | Number and Operations Base Ten 5: Fluently multiply multi-digit whole numbers using the standard algorithm.   * I can fluently multiply multi-digit whole numbers. | Fluently divide multi-digit numbers using the standard algorithm.  Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. |
| Find whole number quotients and remainders (up to 4 digit dividends, one-digit divisors) using any of the following: rectangular arrays, area models, equations, or the relationship between multiplication and division. | Number and Operations Base Ten 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.   * I can divide a multi-digit dividend by a two-digit divisor to find a quotient. * I can illustrate or explain division problems. |

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| |  |  | | --- | --- | | **Standard** | **Learner Objectives** | | Operations and Algebraic Thinking 1:  Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. | * I can evaluate expressions using the order of operations using symbols. * I can place parenthesis and brackets in expressions. |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **What does this standard mean the students will know and be able to do?** | | | | | | | This standard builds on the expectations of third grade where students are expected to start learning the conventional order. Students need experiences with multiple expressions that use grouping symbols **throughout the year** to develop understanding of when and how to use parentheses, brackets, and braces. First, students use these symbols with whole numbers. Then the symbols can be used as students add, subtract, multiply and divide decimals and fractions.  To further develop students’ understanding of grouping symbols and facility with operations, students place grouping symbols in equations to make the equations true or they compare expressions that are grouped differently.   * Begin with expressions that have two operations without any grouping symbols (multiplication or division combined with addition or subtraction. * Using the same digits, with the operations in a different order, have students evaluate the expressions and discuss why the value of the expression is different.   + For example, have students evaluate 5 × 3 + 6 and 5 + 3 × 6. Discuss the rules that must be followed. Have students insert parentheses around the multiplication part in an expression. A discussion should focus on the similarities and differences in the problems and the results. * After students have evaluated expressions without grouping symbols, present problems with one grouping symbol, beginning with parentheses, then in combination with brackets and/or braces. | | | | | | | **Example Problems** | | | | | | | (26 + 18) 4  *Answer: 11* | {[2 x (3+5)] – 9} + [5 x (23-18)]  *Answer: 32* | 12 – (0.4 x 2)  *Answer: 11.2* | 6 – ( + )  *Answer: 5* | {80 [2 x (3 + 1)]} + 100  *Answer: 108* | Compare  3 x 2 + 5 and 3 x (2 + 5) |  |  |  |  |  | | --- | --- | --- | --- | | **Lessons and Resources for Operations in Algebraic Thinking 1** | | | | | [Bank of CGI Problems](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/5th%20Grade/CGI%205th%20Grade%20Story%20Bank.docx) | Unit 1: 2.4A | Unit 7: 4.1 (only the SAB pg. C103) | [APlus Math Order of Operations Flashcards](http://www.aplusmath.com/cgi-bin/Flashcards/Order_Of_Operations) |  |  |  |  | | --- | --- | --- | | **Emphasized Standards for Mathematical Practice** | | | | [1. Make sense of problems and persevere.](http://elementarymath.dmschools.org/1-make-sense-of-problems-and-persevere-in-solving-them5.html) | [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically5.html) | [8. Look for and express regularity in repeated reasoning.](http://elementarymath.dmschools.org/8-look-for-and-express-regularity-in-repeated-reasoning.html) | |

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| |  |  | | --- | --- | | **Standard** | **Learner Objectives** | | Operations and Algebraic Thinking 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 × (8 + 7).* *Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921,* *without having to calculate the indicated sum or product.* | * I can write numerical expressions with operation words. * I can interpret numerical expressions without evaluating them. |  |  |  | | --- | --- | | **What does this standard mean the students will know and be able to do?** | | | This standard refers to expressions. Expressions are a series of numbers and symbols (+, -, x, ÷) without an equals sign. Equations result when two expressions are set equal to each other (2 + 3 = 4 + 1).  **Example:** 4(5 + 3) is an *expression.*  When we compute 4(5 + 3) we are evaluating the expression. The expression equals 32.  4(5 + 3) = 32 is an *equation.*  This standard calls for students to verbally describe the relationship between expressions without actually calculating them. This standard calls for students to apply their reasoning of the four operations as well as place value while describing the relationship between numbers. The standard does not include the use of variables, only numbers and signs for operations.   * Have students write numerical expressions in words without calculating the value. This is the foundation for writing algebraic expressions. * Then, have students write numerical expressions from phrases without calculating them. | | | **Examples** | | | **Write an expression for the steps “double five and then add 26.”**  Student: (2 x 5) + 26 | **Describe how the expression 5(10 x 10) relates to 10 x 10.**  Student: The expression 5(10 x 10) is 5 times larger than the expression 10 x 10 since I know that 5(10 x 10) means that I have 5 groups of (10 x 10). |  |  |  | | --- | --- | | **Lessons and Resources for Operations in Algebraic Thinking 2** | | | [Bank of CGI Problems](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/5th%20Grade/CGI%205th%20Grade%20Story%20Bank.docx) | Unit 8: Investigation 2 (1-7) |  |  |  |  |  | | --- | --- | --- | --- | | **Emphasized Standards for Mathematical Practice** | | | | | [1. Make sense of problems and persevere in solving them.](http://elementarymath.dmschools.org/1-make-sense-of-problems-and-persevere-in-solving-them5.html) | [2. Reason abstractly and quantitatively.](http://elementarymath.dmschools.org/2-reason-abstractly-and-quantitatively3.html) | [7. Look for and make use of structure.](http://elementarymath.dmschools.org/7-look-for-and-make-use-of-structure.html) | [8. Look for and express regularity in repeated reasoning.](http://elementarymath.dmschools.org/8-look-for-and-express-regularity-in-repeated-reasoning.html) | |

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| |  |  | | --- | --- | | **Standard** | **Learner Objectives** | | Number and Operations in Base Ten 5:  **Fluently** multiply multi-digit whole numbers **using the standard algorithm.** | * I can fluently multiply multi-digit whole numbers. |  |  |  |  |  | | --- | --- | --- | --- | | **What does this standard mean the students will know and be able to do?** | | | | | This standard refers to **fluency** which means students select and use a variety of methods and tools to compute, including objects, mental computation, estimation, paper and pencil, and calculators. They work flexibly with basic number combinations and use visual models, benchmarks, and equivalent forms. They are **accurate** and **efficient** (use  a reasonable amount of steps), and **flexible** (use strategies such as the distributive property or breaking numbers apart (decomposing and recomposing) also using  strategies according to the numbers in the problem, 26 x 4 may lend itself to (25 x 4) + 4 where as another problem might lend itself to making an equivalent problem 32 x 4 =  64 x 2)).  The size of the numbers should NOT exceed a three-digit factor by a two-digit factor.  In prior grades, students used various strategies to multiply. Students can continue to use these different strategies as long as they are efficient, but must also understand and be able to use the standard algorithm. In applying the standard algorithm, students recognize the importance of place value. | | | | | **Alternative Strategy Examples:**  **There are 225 dozen cookies in the bakery. How many cookies are there?** | | | | | **Student A** | **Student B** | **Student C** | **Student D** | | 225 x 12  I broke 12 up into 10 and 2.  225 x 10 = 2,250  225 x 2 = 450  2,250 + 450 =  2,700 | 225x12  I broke up 225 into 200 and 25.  200 x 12 = 2,400  I broke 25 up into 5 x 5, so I had  5 x 5 x12 or 5 x 12 x 5.  5 x12= 60. 60 x 5 = 300  I then added 2,400 and 300  2,400 + 300 = 2,700. | I doubled 225 and cut 12 in half to get 450x6.  I then doubled 450again and cut 6 in half to get 900 x 3.  900 x 3 = 2,700. | Draw an array model for 225 x 12. |  |  |  |  | | --- | --- | --- | | **Lessons and Resources for Number and Operations in Base Ten 5** | | | | [Bank of CGI Problems](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/5th%20Grade/CGI%205th%20Grade%20Story%20Bank.docx) | Unit 1   * Investigation 1 (sessions 1 – 4) * Investigation 2 (sessions 1 – 4A) | Unit 7   * Investigation 2 * Investigation 4 (sessions 1 – 4) |  |  |  |  |  | | --- | --- | --- | --- | | **Emphasized Standards for Mathematical Practice** | | | | | [2. Reason abstractly and quantitatively.](http://elementarymath.dmschools.org/2-reason-abstractly-and-quantitatively3.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision3.html) | [7. Look for and make use of structure.](http://elementarymath.dmschools.org/7-look-for-and-make-use-of-structure.html) | [8. Look for and express regularity in repeated reasoning.](http://elementarymath.dmschools.org/8-look-for-and-express-regularity-in-repeated-reasoning.html) | |

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| |  |  | | --- | --- | | **Standard** | **Learner Objective** | | Number and Operations Base Ten 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. | * I can divide a multi-digit dividend by a two-digit divisor to find a quotient. * I can illustrate or explain division problems. |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **What does this standard mean the students will know and be able to do?** | | | | | | This standard references various strategies for division. Division problems can include remainders. Even though this standard leads more towards computation, the connection to story contexts is critical. Make sure students are exposed to problems where the divisor is the number of groups and where the divisor is the size of the groups.  In fourth grade, students’ experiences with division were limited to dividing by one-digit divisors. This standard extends students’ prior experiences with strategies, illustrations, and explanations. When the two-digit divisor is a ―familiar number, a student might decompose the dividend using place value. | | | | | | **Example:**  **There are 1,716 students participating in Field Day. They are put into teams of 16 for the competition. How many teams get created? If you have left over students, what do you do with them?** | | | | | | **Student A** | **Student B** | | **Student C** | **Student D** | | 1,716 divided by 16  There are 100 16’s in 1,716.  1,716 – 1,600 = 116  I know there are at least 6 16’s.  116 - 96 = 20  I can take out at least 1 more 16.  20 - 16 = 4  There were 107 teams with 4 students left over. If we put the extra students on different team, 4 teams will have 17 students. | 1,716 divided by 16.  There are 100 16’s in  1,716.  Ten groups of 16 is 160.  That’s too big.  Half of that is 80, which is  5 groups.  I know that 2 groups of  16’s is 32.  I have 4 students left over. |  | 1,716 ÷ 16 =  I want to get to 1,716  I know that 100 16’s equals 1,600  I know that 5 16’s equals 80  1,600 + 80 = 1,680  Two more groups of 16’s equals 32,  which gets us to 1,712  I am 4 away from 1,716  So we had 100 + 6 + 1 = 107 teams  Those other 4 students can just hang out. | How many 16’s are in 1,716?  We have an area of 1,716. I know that one side of my array is 16 units long. I used 16 as the height. I am trying to answer the question what is the width of my rectangle if the area is 1,716 and the height is 16.  100 + 7 = 107 R 4 |  |  |  |  | | --- | --- | --- | | **Lessons and Resources for Number and Operations in Base Ten 6** | | | | [Bank of CGI Problems](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/5th%20Grade/CGI%205th%20Grade%20Story%20Bank.docx) | Unit 1   * Investigation 3 (session 1 – 4, 6 – 7) | Unit 7   * Investigation 3 (sessions 1 – 6) * Investigation 4 (sessions 1 – 4) |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Emphasized Standards for Mathematical Practice** | | | | | | [2. Reason abstractly and quantitatively.](http://elementarymath.dmschools.org/2-reason-abstractly-and-quantitatively3.html) | [3. Construct viable arguments and critique the reasoning of others.](http://elementarymath.dmschools.org/3-construct-viable-arguments-and-critique-the-reasoning-of-others2.html) | [4. Model with mathematics.](http://elementarymath.dmschools.org/4-model-with-mathematics.html) | [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically5.html). | [7. Look for and make use of structure.](http://elementarymath.dmschools.org/7-look-for-and-make-use-of-structure.html) | |

**Optional Lesson Progression**

Pacing Unit: 7 weeks

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| **Resource** | **Location** | **Primary Focus** | **Standard** |
| [Bank of CGI Problems](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/5th%20Grade/CGI%205th%20Grade%20Story%20Bank.docx) |  | * Teachers use as needed throughout the unit. |  |
| Investigations | Unit 1   * Investigation 1 (sessions 1 – 4) * Investigation 2 (sessions 1 – 4A)   Unit 7   * Investigation 2.3 | * I can fluently multiply multi-digit whole numbers. | NBT.5 |
| Investigations | Unit 1   * Investigation 3 (session 1 – 4, 6 – 7)   Unit 7   * Investigation 3 (sessions 1 – 6) * Investigation 4 (sessions 1 – 4) | * I can divide a multi-digit dividend by a two-digit divisor to find a quotient. * I can illustrate or explain division problems. | NBT.6 |
| Investigations | Unit 1 2.4A | * I can evaluate expressions using the order of operations using symbols. * I can place parenthesis and brackets in expressions. | OA.1 |
| Unit 7 4.1 (only the SAB pg. C103) |
| Investigations | Unit 8   * Investigation 2 (1-7) | * I can write numerical expressions with operation words. * I can interpret numerical expressions without evaluating them. | OA.2 |

**\*Units are designed for one lesson per day. This is an approximate. Some lessons may take more than one day. Use teacher discretion based on student need when planning unit length.**