Grade Level	Content Area	Course Title *(For 9 -12 Samples Only)*	Unit Title
Grade 5	Mathematics		Simplifying Numerical Expressions

Length of Unit	Time of Year Taught	Expected Prior Knowledge
4 Days	1st quarter of first semester	Add and subtract whole numbers to five digits. Multiply and divide 2 digit whole numbers. Add, subtract, multiply, or divide five numbers (18 + 44 + 92 + 156 + 77 = 387). Experienced and simplified math problems containing parenthesis. Experienced and simplified math problems using the squaring exponent. Be able to square numbers up to 13 (13^2 simplified is 169).

Unit Description

The Unit contains two key components: examining numerical expressions and solving numerical expression using the order of operations rules. Students begin the unit by being able to identify, write, and simplify easy numerical expressions. Students expand their knowledge and begin to understand the need for rules in solving more complicated expressions. The order of operations rules are introduced with the pneumonic: Please Excuse My Dear Aunt Salley. Emphasis is placed on the equality of importance of multiplication and division, and addition and subtraction within an expression without parentheses (left to right is the determining factor). The students then will practice solving more complicated numerical expressions using the rules.

Bloom's taxonomy target: Analysis. Upon reaching comprehension and application, the intent is to promote analysis: breaking material into constituent parts, determining how the parts relate to one another and to the overall structure through analyzing. Take concepts apart, break them down, analyze structure, recognize concepts and evaluate.

Standards: Common Core **Domain:** Operations and Algebraic Thinking **Cluster:** Write and Interpret Numerical Expressions **Standard #1:**	**Standard #1:** Use parenthesis, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Summative Assessment	Students will be assessed based on teacher observation and their written ability to • Determine what constitutes a numerical expression • To identify and write a numerical expression • Understand the mathematical rules for order of operations. • To simplify a numerical expression using the rules for order of operations.

Assessment Scoring	Students will be assessed on the following scale: A (90 – 100%), B (80 – 89%), C (70 – 79%), D (60 – 69%), and F (59% and below). A total of 8 out of 10 points represents unit mastery. 9 - 10 points = A, 8 points = B, 7 points = C, 6 points = D, 5 points and below = F The summative assessment is entitled, "Order of Operations – PEMDAS worksheet. It has 10 questions, each worth 1 point. 80% or better represents mastery (8 points or better)
Materials/Resources Needed	In-class computer; projector; PowerPoint presentation "What is a Numerical Expression;" **Saxon Math 6/5** textbook; **Saxon** Lesson 24; "Writing Numerical Expressions" worksheet; PowerPoint presentation "Please Excuse My Dear Aunt Salley;" "Order of Operations: PEMDAS" summative assessment worksheet; blank monthly calendar grid, colored pencils, "Calendar Fun Operations" 30 numerical expressions and corresponding symbols; individual computers for each student (or one computer for every student pair); internet access; "Order of Operations Bingo" cards; and counters.

This table is consistent with the methods of instruction and assessment described in the narrative.

	Lesson 1 (Day 1)	Lesson 2 (Day 2)	Lesson 3 (Day 3)	Lesson 4 (Day 4)
Teacher Instruction	Introduction: Ask the student what do all the following have common: • 4 + 20 – 7 • (2 + 3) – 7 • (6 × 2) ÷ 20 • 5 ÷ (20 × 3) Review the definition of a numerical expression: A numerical expression is a mathematical phrase that includes only numbers and operation symbols. Note: there is not an "=" sign. If an expression has a "=" sign, it is called an equation. Note: there are no variables	Introduction: Write a sentence on the board that can be read different ways depending on punctuation. (Judith Ann Bailey and I love computers --- Judith, Ann, Bailey, and I love computers) Discuss how the meaning of the sentence changes with the commas. Introducing Order of Operations: Ask students to simplify $10 + 2 \times 3 - 1$ to get as many answers as they can. (With and without order of operations: possible answers are 35, 15, 24, and 14. The correct answer is 15.) Discuss how a standard is needed such that all people will have the	Introduction: Return to the students the PEMDAS Numerical Expression worksheet from yesterday and review as needed. Introduce the "Calendar Fun Operations" Project. This project activity is designed to help students evaluate numerical expressions by using order of operations. The students will be provided with a blank calendar for the next month of the	Practice simplifying expressions and practicing order of operations using computer math games. Use the in-class computer and projector, go to websites: "Simplify Expressions Using Order of Operations and Parentheses." *http://www.ixl.com/math/grade-5/simplify-expressions-using-order-of-operations-and-parentheses*

	(letters to represent a number). If an expression has a variable, then it is called a variable expression (versus a numerical expression). Lesson: Show the PowerPoint presentation, "What is a Numerical Expression?" Have students orally recite the numerical expression from the given information presented on each slide. Guided Practice: Review the **Saxon Math 6/5** Lesson 24, "Parentheses and the Associative Property" using the **Saxon Math 6/5** textbook. Guide students through the process of simplifying numerical expressions. Practice: Have the students practice simplifying numerical expressions by completing **Saxon** Lesson 24, practice problems a – g, and mixed practice 1 – 29 (odd). Practice: Have the students practice writing expressions. Hand out and have the students complete "Writing Numerical Expressions" worksheet.	same result when given this problem. A standard order of operations is required. Lesson: Show the PowerPoint presentation, "Please Excuse My Dear Aunt Salley" using the in-class computer and projector. Have the students orally simplify the expressions as they are given with the PowerPoint. Explain steps as necessary and correct outages. Insure students understand that multiplication – division without any parenthesis is completed left to right AND that addition – subtraction without any parenthesis is completed left to right. Students tend to think that multiplication (addition) is ALWAYS first before division (subtraction), which is not the case – it depends on which is first when reading left to right (without parenthesis). Play class "Order of Operations Bingo" game. Use prepared bingo cards, counters, and write numerical expressions on the board in which the student must simplify the expression. The first student to cover 5 of their numbers in a row on their card is the winner.	year. Students will then be provided with a worksheet that contains 30 expressions and a different symbol for each expression. The students will manually calculate each expression using order of operations. Once the numerical value has been discovered for each expression, the symbol next to the expression will be drawn on the calendar for that date. (For example, for the numerical expression, $28 - 21 \div 7$, this is simplified expression is given the symbol representation of a "star;" hence, on the calendar for the date of the 25th, a star is drawn in that calendar square.) Provide students with a blank monthly calendar grid, colored pencils, and the 30 numerical expressions with corresponding symbols. Have students display their calendars.	and "Order of Operations Mystery Picture" *http://www.dositey.com/2008/math/m/mystery2SMA34.htm* and "Wicked Matho 2," an online order of operations bingo game (best if played with minimum 2 players) *http://www.tki.org.nz/r/wick_ed/maths/interactives_matho2.php* Model how to use the program games. Arrange for students to have their own computer (or two students for every one computer) such that each student (or pairs of students) can play on their own game. Summative Assessment: Have students complete the order of operations expression worksheet, "Order of Operations: PEMDAS." 80% or better represents mastery.

Student Activity	Students will participate by giving oral answers during the PowerPoint presentation, "What is a Numerical Expression?" Oral answers will be corrected and evaluated. Numerical expressions will be shared with each other. Students will practice developing written numerical expressions and simplifying numerical expressions. Students will complete the **Saxon** Lesson 24 and the "Writing Numerical Expressions" worksheet	Students will participate by giving oral answers as to possible simplification to the equation, $10 + 2 \times 3 - 1$. Students will participate in oral discussion during the PowerPoint presentation, "Please Excuse My Dear Aunt Salley." Students will participate in the class "Order of Operations Bingo" game.	Students will make the "Calendar Fun Operations" project using skills of order of operations and simplifying numerical expressions.	Students will play the three on-line games to practice their multiplication problem solving skills. Students will complete the worksheet, "BBC Multiplication." Students will complete the summative assessment in which the students must simplify numerical expressions using the order of operations rules. Students will complete the "Order of Operations: PEMDAS" worksheet.

Name: _____

5th Grade Math Assessment
Order of Operations - (PEMDAS) Worksheet

1) (15 + 5) x 9 + 2

2) (13 + 2) + 18 ÷ 9

3) 2 x 7 x (3 + 9)

4) (8 +24) ÷(0 + 2)

5) (13 +41 - 6) ÷ 8

6) (12 - 4) x 12 – 3

7) (9 +51) ÷(9 + 3)

8) (8 +54 - 2) ÷ 6

9) 7 x 3 x (2 + 4)

10) (8 - 2) + 18 ÷ 6

PEMDAS: Please Excuse My Dear Aunt Salley

Please:	P	Parenthesis
Excuse:	E	Exponents
My Dear	MD	Multiplication/Division (complete left to right)
Aunt Salley	AS	Addition/Subtraction (complete left to right)

Order of Operations - (PEMDAS)
Answer Key

1) (15 + 5) x 9 + 2
20 x 9 + 2
180 + 2
182

2) (13 + 2) + 18 ÷ 9
15 + 18 ÷ 9
15 + 2
17

3) 2 x 7 x (3 + 9)
2 x 7 x 12
14 x 12
168

4) (8 +24) ÷(0 + 2)
32 ÷ 2
16

5) (13 +41 - 6) ÷ 8
(54 - 6) ÷ 8
48 ÷ 8
6

6) (12 - 4) x 12 - 3
8 x 12 - 3
96 - 3
93

7) (9 +51) ÷(9 + 3)
60 ÷ 12
5

8) (8 +54 - 2) ÷ 6
(62 - 2) ÷ 6
60 ÷ 6
10

9) 7 x 3 x (2 + 4)
7 x 3 x 6
21 x 6
126

10) (8 - 2) + 18 ÷ 6
6 + 18 ÷ 6
6 + 3
9

5th Grade Math Test Scoring Rubric:

Students will be assessed based on teacher observation and their ability to

- Determine what constitutes a numerical expression
- To identify and write a numerical expression
- Understand the mathematical rules for order of operations.
- To simplify a numerical expression using the rules for order of operations.

Grade	Number of questions correct
A	9-10
B	8
C	7
D	6
F	5 or below

Mastery is at 80% and above