A.5. CURRICULUM SAMPLE – Fifth Grade Math

Grade Level	Content Area	Course Title	Unit Title
Fifth Grade	**Mathematics**	**N/A**	**Algebraic Representations/Problem Solving**

Length of Unit	Time of Year Taught	Expected Prior Knowledge
5 days	**4th Quarter**	Every student should understand and use all concepts and skills from the previous grade levels with regard to Mathematics, according to Common Core Standards.

Unit Description

In this unit students review the concept of order of operations with the introduction of parenthesis, brackets, and braces. Students will simplify expressions using these symbols. Students will also learn how to write and interpret numerical expressions without evaluating them.

Common Core Standards	**5.OA.1-2** 1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 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.*
Summative Assessment	The assessment includes the following tasks: 1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 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.*
Assessment Scoring	Part 1: #1-10 (2 points per question) Students should use order of operations correctly and do the math correctly (no mathematical errors). Part 2: #1- 7 (3 points per question) Students should write the expression correctly and then solve it correctly (no mathematical errors) Total of 31 points Mastery is considered a score of 80% or higher on this assessment.
Materials/Resources Needed	Math Journals, Pencils, Whiteboards (one per student), dry erase markers (one per student), erasers (Kleenex works), Worksheets A, B, and Assessment, whiteboard and marker (for teacher), Order of Operations pyramid

	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5

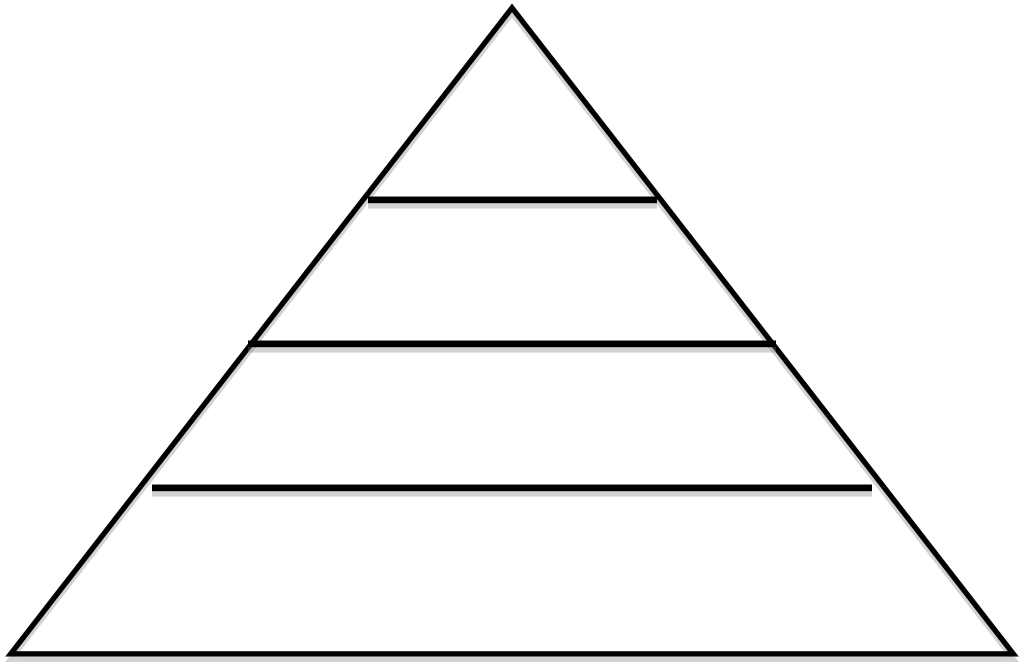
Lesson Instruction	**<u>Day 1:</u>** **Objective:** Students will use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 1. Write the following problem on the board: 2+4 x 6 - 3 and ask the student to solve it in their math journals. Allow students to finish and then have a few students share their answers. Usually you will get a variety of answers because they forget to use Order of Operations (O. of O.) 2. Review the O. of O. Pyramid with students and tell them that you are introducing parenthesis, brackets, and braces this year. Brackets [ ] and braces { } have the same function as parentheses. They are all *grouping symbols*. After parentheses are used, then for clarity we use brackets. And after brackets, braces. 3. Students should draw the pyramid and make notes in their math	**<u>Day 2:</u>** **Objective:** Students will solve problems that use parentheses, brackets, or braces in numerical expressions. 1. Begin class with a review of the previous lesson. Pass out student whiteboards, markers, and erasers. Write problems on the board and have students copy them down and solve them on their whiteboards referring back to their notes as needed. Do at least five problems with a variety of operations and be sure to include parenthesis, brackets, and braces. Check student work for each problem and model how to solve on the board prior to moving on to the next problem. **(This is a great informal assessment)** 2. Have students finish Worksheet A and check with a partner or small group. Encourage students to "find and correct" their mistakes. 3. Go over problem from	**<u>Day 3:</u>** **Objective:** Students will write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. 1. Write the following on the board: add 8 and 7, and then multiply by 2. Have students write it in their journals and then tell them to write it as an expression using digits and symbols. Allow students to discuss what they think the expression means with a partner. 2. Have a few groups of students write their expressions on the board. 3. Lead the class in a discussion to determine which expression is correct. Elicit the explanation that 2 x (8 +7) means that 2 x (8 +7) is two times larger than (8 + 7). 4. **Independent Practice** Pass out Worksheet B and have students work	**<u>Day 4:</u>** **Objective:** Students will write statements as expressions and solve problems. 1. Begin class by asking a few students to share their original problems from Worksheet B. Pass out student whiteboards, markers, and erasers. **Guided Practice** Tell students to write the statements as expressions and solve on their whiteboards. Check student work after each problem. 2. **Independent Practice** Write review problems on the board. Use problems from Worksheets A and B just change some of the numbers to make the problems different. Allow them to work in pairs or small groups to complete the review in their math journals. 3. Leave enough time to go over the review before the end of class in order to answer any questions before the test.	**<u>Day 5:</u>** **Objective:** Students 1. Pass out assessment and pencils.

	journals. 4. **Guided Practice:** Write the problem: 2(3 +5) on the board. Walk students through the process of looking at the pyramid and going through O. of O. to simplify. Remind them to start at the TOP of the pyramid. 5. Repeat this process with the problems: 3[2(1+3)-1] and $10 - \{2 + [3 - (7 - 5)]\}$ Answer any questions the students might have. 6. **Independent Practice** Assign worksheet A, students may choose 5 problems to work on with a partner for the remainder of class.	Worksheet A with the class to check for understanding, answering any questions.	in pairs or small groups to complete it.		

	Lesson 1	**Lesson 2**	**Lesson 3**	**Lesson 4**	**Lesson 5**
Student Activities	1. Students will solve the problem from the board in their math journals. 2. Students will copy the O. of O. pyramid into their math journals and takes notes. 3. Students will begin Worksheet A in pairs or small groups.	**Day 2** 1. Students will solve problems on their whiteboards in order to review from the previous lesson. 2. Students will finish Worksheet A from the previous lesson and then check their work with	**Day 3** 1. Students will copy the problem in their journals and then write it as an expression using digits and symbols. 2. Students will discuss what they think the expression means with a partner.	**Day 4** 1. A few students will share their original problems from WS B. 2. Students will use whiteboards to write the problems as expressions and then solve. 3. Students will copy review problems from the	**Day 5** Students will complete a summative assessment.

		their partner or small group. 3. Student will do a final check as the teacher reviews the problems with the whole class.	2. A few groups of students will write their expressions on the board. 3. Students will participate in a class discussion about the expressions on the board determining which is correct. 4. Students will begin Worksheet B in pairs or small groups.	board and work in pairs or small groups to complete the review. 4. Students will check their review problems with the teacher as a group and ask any questions to prepare for the test.	

Order of Operations Pyramid
Adapted from www.auburnschools.org
Remember to start at the TOP



Try to view order of operations as a pyramid and that you will always work from the top of the pyramid toward the bottom. Think to yourself, "What level of the pyramid am I on now?"
You may need multiple rows of work to solve one problem!
Example problem: $9^2 + (3 \text{ X } 5) =$ _____

Worksheet A

Simplify and Solve.

5 x 4 – 8

$5 - [3 - (4 - 2)]$

1 + 7 x 2

(30 – 3) / 3

(21 – 5) / 8

(9 + 18 -3) / 8

9 x 2 / 2 + 1

$5 - [3 - (4 + 2)]$

$10 - \{2 + [3 - (8 - 5)]\}$

$8 + \{2 - [12 + (6 - 2)]\}$

Worksheet B

Write each statement as an expression. Be sure to include parenthesis, brackets, and braces if needed. Solve.

Add 3 and 6, and then multiply by 2

Subtract 10 and 6 and divide by 2

Add the quantity 2 and 2, and then divide by 4

Subtract the quantity 7 and 3, and then multiply by 4

Subtract the quantity 8 -5 from 3, then add 2, finally multiply by 3.

Write 2 of your own statements. One of them MUST include parenthesis.

Algebraic Representations/Problem Solving (with answer key)

Assessment

Part 1

Simplify and Solve. (2 points each)

1. 6 x 4 – 8

2. 5 − [2 − (3− 2)]

3. 3 + 7 x 2

4. (33 – 6) / 3

5. (20 – 4) / 8

6. (7+ 6 -3) / 2

7. 6 x 3 / 2 + 1

8. 10 − [8 − (5 + 3)]

9. 9 − {3 + [4 − (9 − 5)]}

10. 7 + {2 − [11 + (5 − 1)]}

Part 2

Write each statement as an expression. Be sure to include parenthesis, brackets, and braces if needed. Solve. (3 points each)

1. Add 5 and 2, and then multiply by 2

2. Subtract 10 and 4 and divide by 2

3. Add the quantity 4 and 8, and then divide by 4

4. Subtract the quantity 5 and 3, and then multiply by 4

5. Subtract the quantity 6 -5 from 3, then add 1, finally multiply by 3.

Write 2 of your own statements. One of them MUST include parenthesis. Then write it as an expression and solve.

6.

7.

Assessment Key

Part 1

1. 6 x 4 – 8 =16 **2.** 5 − [2 − (*3*− 2)] = 4 **3.** 3 + 7 x 2 = 17 **4.** (33 – 6) / 3 =9

5. (20 – 4) / 8 = 2 **6.** (7+ 6 -3) / 2 =5 **7.** 6 x 3 / 2 + 1 = 6 **8.** 10 − [8 − (*5* + 3)] = 10

9. 9 − {3 + [4 − (*9* − 5)]} =6 **10.** 7 + {2 − [11 + (5 − 1)]} = -6

Part 2

1. Add 5 and 2, and then multiply by 2 2 x (5 +2) = 14
2. Subtract 10 and 4 and divide by 2 (10 – 4)/2 = 3
3. Add the quantity 4 and 8, and then divide by 4 (4 + 8)/4 = 3
4. Subtract the quantity 5 and 3, and then multiply by 4 4 x (5 – 3) = 8
5. Subtract the quantity 6 -5 from 3, then add 1, finally multiply by 3. 3 x [1+ (6 – 5)] =6
6. Answers will vary
7. Answers will vary