

Grade 5 Operations and Algebraic Thinking Unit of Instruction

This is a progressive unit of instruction using the [Concrete-Representational-Abstract \(CRA\) Instructional Model](#). CRA is a three-part instructional model that begins by using concrete materials, then progresses to representational pictures and finally abstract notation. This unit is not intended to replace your district's curriculum, but rather it serves to support the teaching and learning of the fifth grade operations and algebraic thinking standards. In this unit, students will begin by investigating the standards while using manipulatives to explore the concepts. Then, students will represent their learning through pictures, visuals and drawings. Finally, students will demonstrate their understanding through abstract notation and algorithms. This unit of study will cover the following standards [MAFS.5.OA.1.1](#), [MAFS.5.OA.1.2](#) and [MAFS.5.OA.2.3](#).

The unit begins with a list of resources and tools to assist in teaching operations and algebraic thinking. Then, each of the grade five operations and algebraic thinking standards is listed along with aligned instructional resources and formative assessments. The component of CRA is identified for each of the resources and formative assessments. The resources presented in this document may only cover portions of the aligned standard and represent a small sample of those available on [CPALMS](#).

The Mathematical Practices are habits of mind that describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. The Mathematical Practices should be infused during the course and will be assessed throughout the Grade 5 Mathematics FSA. More information about each Mathematical Practice can be found by clicking on the links below.

[MAFS.K12.MP.1.1](#) Make sense of problems and persevere in solving them.

[MAFS.K12.MP.2.1](#) Reason abstractly and quantitatively.

[MAFS.K12.MP.3.1](#) Construct viable arguments and critique the reasoning of others.

[MAFS.K12.MP.4.1](#) Model with mathematics.

[MAFS.K12.MP.5.1](#) Use appropriate tools strategically.

[MAFS.K12.MP.6.1](#) Attend to precision.

[MAFS.K12.MP.7.1](#) Look for and make use of structure.

[MAFS.K12.MP.8.1](#) Look for and express regularity in repeated reasoning.

Operations and Algebraic Thinking

<p>A bibliography of children's literature with a focus on operations and algebraic thinking is provided. These books can be integrated into the lessons to connect mathematics and literature.</p>	<ol style="list-style-type: none"> 1. <i>Anno's Mysterious Counting Jar</i>, Mitsumasa & Masaichiro Anno 2. <i>In the Next Three Seconds</i>, Rowland Morgan 3. <i>The King's Chessboard</i>, David Birch 4. <i>One Grain of Rice</i>, Demi 5. <i>Two Ways to Count to Ten</i>, Ruby Dee 6. <i>What Comes in 2's, 3's and 4's</i>, Suzanne Aker
<p>5th Grade Mathematics Course Description</p>	<p>Course descriptions provide an overview for a course and designate which standards are in that course. The course description includes resources for all 40 standards within the 5th grade mathematics course.</p>
<p>One Step at a Time Is My Equation True or False? Fantastic Factors Pattern Fun <i>Lesson Plans</i></p> <p>Concrete-Representational-Abstract</p>	<p>This sequence of four lessons is designed to guide students through the operations and algebraic thinking skills presented in grade four. Students will gain an understanding of the grade four multiplication and division concepts through multiple representations.</p>
<p>Test Item Specifications</p>	<p>The Test Item Specifications indicate the alignment of items with the Florida Standards. Assessment limits are included in the specifications, which define the range of content knowledge in the assessment items for the standard. Sample items for each standard are also included in the specifications document.</p>
<p>Test Design Summary and Blueprint</p>	<p>The Test Design Summary and Blueprint shows the reporting categories with a corresponding weight for the 5th Grade Mathematics FSA.</p>
<p>Florida Students</p>	<p>Resources specifically designed with students in mind are available on Florida Students. Florida Students is an interactive site that provides educational resources aligned to the Florida Standards.</p>
<p>5th Grade Mathematics Parent Guide</p>	<p>The parent guide will support parents and families with children in Grade 5 Mathematics.</p>

Instructional Resources

[MAFS.5.OA.1.1](#) Use parentheses, brackets or braces in numerical expressions, and evaluate expressions with these symbols.

Please Excuse My Dear Aunt Sally <i>Lesson Plan</i> Representational-Abstract	The students will learn and use the order of operations. In groups, the students will work together to discover the importance of following step-by-step instructions and apply that knowledge in solving algebraic equations.
Introduction to the Order of Operations <i>Tutorial</i> Abstract	In this Khan Academy tutorial video, students will see why it is important to have one agreed upon order of operations.
The Expression Debate <i>Original Tutorial</i> Abstract	By the end of this tutorial, students will be able to evaluate expressions that have all four operations (multiplication, division, addition, and subtraction), as well as parentheses.
Evaluate an Expression With and Without Parentheses <i>Tutorial</i> Abstract	This Khan Academy tutorial video presents the application of parentheses notation in an expression.
Watch Out for Parentheses <i>Problem-Solving Task</i> Abstract	This problem asks students to evaluate six numerical expressions that contain the same integers and operations, yet have differing results due to placement of parentheses. This type of problem helps students to see structure in numerical expressions.

Formative Assessments

Evaluating Expressions Abstract	Students are asked to evaluate two similar expressions and explain why the answers are different.
More Expressions Abstract	Students are asked to insert parentheses into an expression in two different ways, evaluate each way, and explain why the answers are different.
Place the Parentheses Abstract	Students are given an equation and asked to place parentheses within the equation to make the equation true.
With and Without Parentheses Abstract	Students consider two different yet similar equations and determine if they are true.

Instructional Resources

[MAFS.5.OA.1.2](#) 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 $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.*

<p>Seeing is Believing <i>Problem-Solving Task</i></p> <p>Representational-Abstract</p>	<p>The purpose of this task is to help students see that $4 \times (9+2)$ is four times as big as $(9+2)$. Though this task may seem very simple, it provides students and teachers with a very useful visual for interpreting an expression without evaluating it.</p>
<p>Constructing a Numerical Expression Example <i>Tutorial</i></p> <p>Abstract</p>	<p>This Khan Academy tutorial video demonstrates how to write a simple expression from a word problem.</p>
<p>Translating Expressions with Parentheses <i>Tutorial</i></p> <p>Abstract</p>	<p>This Khan Academy tutorial video interprets written statements and writes them as mathematical expressions.</p>
<p>Comparing Products <i>Problem-Solving Task</i></p> <p>Abstract</p>	<p>The purpose of this task is to generate a classroom discussion that helps students synthesize what they have learned about multiplication in previous grades. It helps students reason quantitatively without calculating or solving.</p>
<p>Video Game Scores <i>Problem-Solving Task</i></p> <p>Abstract</p>	<p>This task asks students to write an expression and interpret a given expression. The focus of this problem is not on numerical answers, but instead on building and interpreting expressions.</p>
<p>Words to Expressions <i>Problem-Solving Task</i></p> <p>Abstract</p>	<p>This problem allows students to see words that can describe a mathematical expression. The words sum and product are strategically used so that students can relate these words to mathematical operations.</p>

Formative Assessments

Brayden's Video Game Abstract	Students are asked to write an expression requiring more than one operation and the use of parentheses to model a word problem.
Comparing Products Abstract	Students are asked to analyze and compare two related products.
How Much Greater is the Product? Abstract	Students are asked to model an expression that is a multiple of a sum and to compare the expression to the sum.
Write the Expression Abstract	Students are presented with a verbal description of a numerical expression and are asked to write the expression and then compare it to a similar expression.

Instructional Resources

[MAFS.5.OA.2.3](#) Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

<p>Cartesian Classroom Lesson Plan</p> <p>Concrete-Representational-Abstract</p>	<p>The classroom is turned into a human Cartesian coordinate plane, thereby introducing students to the characteristics of the Cartesian coordinate system.</p>
<p>Cool School Lesson Plan</p> <p>Concrete-Representational-Abstract</p>	<p>In this lesson, students will solve a variety of real-life word problems, involving number sense and recording data. Students will also analyze data to answer real-world questions.</p>

Formative Assessments

<p>Choo Choo Trains Company</p> <p>Abstract</p>	<p>Students are asked to fill in missing values in a table of numerical patterns and describe relationships between corresponding terms.</p>
<p>Comic Books</p> <p>Abstract</p>	<p>Students are asked to complete one of two number patterns, write ordered pairs composed of corresponding terms, graph the ordered pairs and identify a relationship between corresponding terms of the patterns.</p>
<p>Exploring Related Patterns</p> <p>Abstract</p>	<p>Students are asked to complete one of two number patterns, write ordered pairs composed of corresponding terms, graph the ordered pairs and identify a relationship between corresponding terms of the patterns.</p>
<p>Generating Two Patterns</p> <p>Abstract</p>	<p>Students are given two rules and are asked to generate patterns.</p>