Dear Parents,
We will begin our next unit of study in math soon. The information below will serve as an overview of the unit as you work to support your child at home. If you have any questions, please feel free to contact me. I appreciate your ongoing support.

Sincerely,
Your Child's Teacher

Unit Name: Using Models to Explore Properties of Multiplication and Division

North Carolina Content State Standards:

NC.5.OA.2
Write, explain, and evaluate numerical expressions involving the four operations to solve up to two-step problems. Include expressions involving:

- Parentheses, using the order of operations.
- Commutative, associative and distributive properties.

NC.5.NBT.5
Demonstrate fluency with the multiplication of two whole numbers up to a three-digit number by a two-digit number ~~using the standard algorithm~~.

NC.5.NBT.6
Find quotients with remainders when dividing whole numbers with up to four-digit dividends and two-digit divisors using rectangular arrays, area models, repeated subtraction, partial quotients, and/or the relationship between multiplication and division. ~~Use models to make connections and develop the algorithm.~~

NC.5.MD.4
Recognize volume as an attribute of solid figures and measure volume by counting unit cubes, using cubic centimeters, cubic inches, cubic feet, and improvised units.

NC.5.MD.5
Relate volume to the operations of multiplication and addition.

Math Language:

- Rectangular Prism
- Order of Operations
- Rectangular Sections
- Expanded Notation
- Associative Property of Multiplication
- Partial Quotient
- Dimension
- Expression
- Partial Products
- Expanded Form
- Distributive Property
- Estimate
- Volume
- Equation
- Divisor
- Dividend
- Commutative Property
- Cubic Units
- Area Model
- Quotient
- Remainder
- Associative Property

Unit Overview:

This unit will focus on the following concepts: Volume, Numerical Expressions, and Multiplication and Division of Whole Numbers. Although volume is first introduced in fifth grade, students will build on their previous knowledge and skills from third and fourth grades when working with all the concepts in this unit.

This unit is based on the understanding that volume is a form of measurement. Students will learn that the unit of volume, such as a cube with side lengths of 1 inch, is called a unit cube. They will explore volume concepts by building objects, such as rectangular prisms (like shoe boxes, tissue boxes, juice boxes, etc.), with layers of unit cubes to see how the volume is comprised. Students will use this experience to help them visualize and compare the volumes

of rectangular prisms with different dimensions. Students will begin to reason about volume and understand that they can find the number of unit cubes in each layer by multiplying the length times the width of the rectangular prism. They also come to understand that the height of the prism is important, as it identifies how many layers of unit cubes will fit in the prism. Students should be given concrete experiences of breaking apart (decomposing) 3-dimensional figures (layer by layer) in order to find the volume of the entire 3-dimensional figure. After many opportunities to explore this idea, students can begin to relate volume to the operations of multiplication and addition.

Students will use expressions, which are series of numbers and symbols (+, -, x, ÷) without an equal sign. Students are expected to interpret (describe) and write numerical expressions without actually calculating them. They are also introduced to the use of parentheses, the order of operations, and the commutative, associative and distributive properties (see examples below). Students will use the four operations as well as place value when describing the relationship between numbers.

Students will focus on strategies to multiply and divide whole numbers during this unit. Focusing on strategies will be key to helping students develop a conceptual understanding of these operations. At this time, students should not use the standard algorithm to solve multiplication and division.

Skills/Strategies:

Students will be able to:

- Write, explain, and evaluate numerical expressions with up to two steps using the four operations
- Use the associative property to determine volume
- Use the commutative, associative, and distributive properties to solve expressions
- Use models to fluently multiply two whole numbers (up to a three-digit number by two-digit number)
- Use area models, repeated subtraction, and partial quotients to divide whole numbers
- Measure volume by counting unit cubes, using cubic and improvised units
- Calculate volume of a rectangular prism by multiplying the edge lengths, using the volume formula
- Find volume of a solid figure composed of two non-overlapping rectangular prisms

Examples of Strategies used in the Unit:

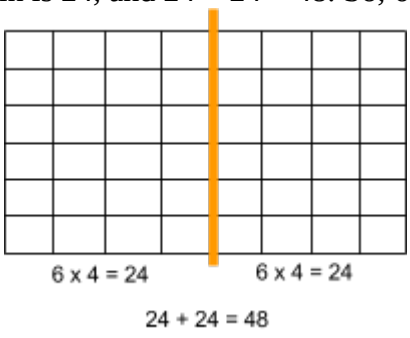
Write an expression for the steps “double seven and then add 13.”

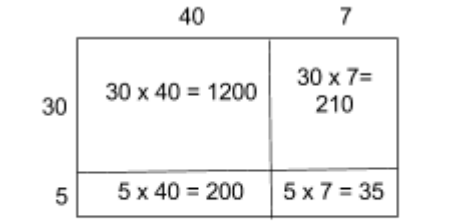
Student
(2 x 7) + 13

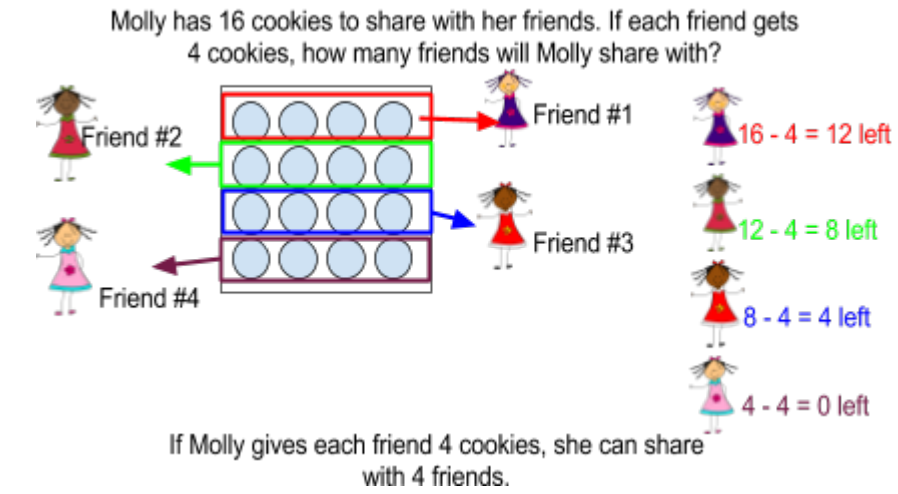
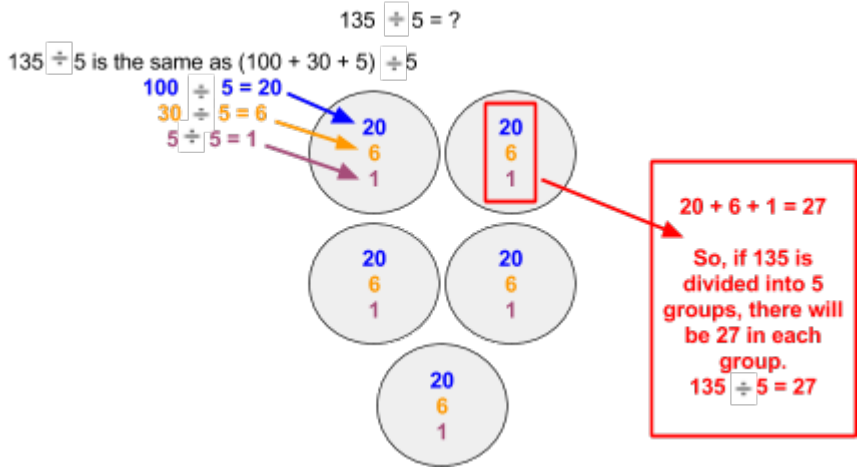
Describe how the expression 5 x (10 x 10) relates to 10 x 10.

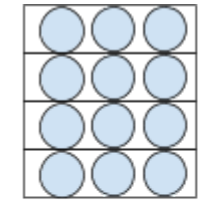
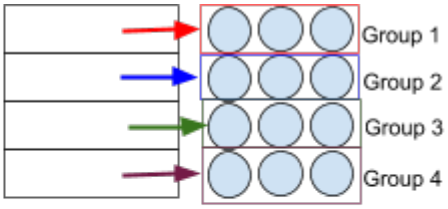
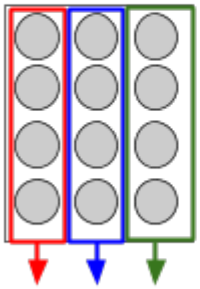
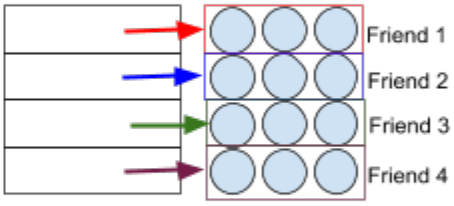
Student
The expression 5 x (10 x 10) is 5 times larger than the expression 10 x 10 since I know that I that 5 x (10 x 10) means that I have 5 groups of (10 x 10).

Commutative Property	The order of numbers can be moved around in addition and multiplication and the result will stay the same. Examples: 3 + 5 = 8 and 5 + 3 = 8 4 x 3 = 12 and 3 x 4 = 12
Distributive Property	Multiplying a number by a group of numbers added together is the same as multiplying each number separately. Example: break apart one factor (6) with addition into 2 + 4 and multiply each of those addends (2 and 4) by 3: 3 x 6 3 x (2 + 4) 3 x 2 + 3 x 4
Associative Property	Numbers can be added or multiplied regardless of how the numbers are grouped. **3 + 7 + 5 = __** **(3 + 7) + 5 = __** **(10) + 5 = 15** **3 + 7 + 5 = __** **3 + (7 + 5) = __** **3 + 12 = 15**

Strategies for Multiplication		
Use facts you already know	6 x 3 = ? I know 6 x 2 = 12, so 6 x 3 = 18	29 x 7 = ? I know 30 x 7 = 210 and 210 - 7 = 203, so, 29 x 7 = 203
Use an array to break apart unknown facts	"I do not know what 6 x 8 is, but I do know that 6 x 4 = 24 and 6 x 4 again is 24, and 24 + 24 = 48. So, 6 x 8 = 4."  	

Use an area model to break apart numbers by their place value	47 x 35 = (40 x 30) + (40 x 5) + (30 x 7) + (7 x 5) 47 x 35 = 1200 + 200 + 210 + 35 47 x 35 = 1645 Example of an area model:  (30 x 40) + (5 x 40) + (30 x 7) + (5 x 7) = 1645 1200 + 200 + 210 + 35 = 1645

Strategies for Division	
Repeated subtraction in groups	Taking a group at a time 
Separating into groups	

Using relationship between multiplication and division	 4 groups of 3 is 12 4 x 3 = 12 so  12 objects divided into 4 groups is 3 objects in each group 12 ÷ 4 = 3
** Although the division situations may have the same equation, the story may be different.	12 ÷ 4 = 3 **Story #1:** Tyshawn has 12 video games to give each of his friends 4 video games. How many friends could he share his video games with?  Friend 1 Friend 2 Friend 3 Tyshawn can share his video games with 3 friends. **Story #2:** Tyshawn has 12 video games to share with his 4 friends. How many video games will each friend get?  Each friend will get 3 video games.

Video Support:

Video support can be found on The WCPSS Academics YouTube Channel.
http://tinyurl.com/WCPSSAcademicsYouTube

- ES 5 Math Whole Number Multiplication with Area Model
- ES 5 Math Whole Number Division with Rectangle & Expanded Notation
- ES 5 Math Whole Number Division with Base Ten Blocks

Additional Resources:

- NCDPI Additional Resources

Questions to Ask When Helping Your Child with Math Homework

Keep in mind that homework in elementary schools is designed as practice. If your child is having problems, please let the classroom teacher know. When helping your child with his/her math homework, you don't have to know all the answers! Instead, we encourage you to ask probing questions so your child can work through the challenges independently. Some examples may include the following:

- What is the problem you're working on?
- What do the directions say?
- What do you already know that can help you solve the problem?

- What have you done so far and where are you stuck?
- Where can we find help in your notes?
- Are there manipulatives, pictures, or models that would help?
- Can you explain what you did in class today?
- Did your teacher work examples that you could use?
- Can you go onto another problem & come back to this one later?
- Can you mark this problem so you can ask the teacher for an explanation tomorrow?