

Math 3 - Act. 07: Pattern Search

Summary

This pattern search activity will improve students' understanding of the commutative property and associative property.

Main Core Tie

Mathematics Grade 3

[Strand: OPERATIONS AND ALGEBRAIC THINKING \(3.OA\) Standard 3.OA.5](#)

Materials

- unifix cubes (shared between 5-6 participants)
- centimeter paper and overhead
- blackline master of array of triangles front/back & overhead
- *Grapes of Math*
by Greg Tang
- transparency copy of p. 7 of *Grapes of Math* or plastic ants

Additional Resources

Math For all Seasons by Greg Tang

Navigating Through Algebra in Grades 3-5 (I Spy) Navigation Series NCTM

Background for Teachers

Students have been working with mathematical properties since kindergarten even though they haven't been calling them by the formal names. You will be exploring some of these properties in this activity. Below you will see the name of the properties explored in third grade and a sample of each.

Commutative Property of Addition (sometimes called the Order Property of Addition) $4 + 5 = 5 + 4$

*Commutative Property of Multiplication (sometimes called the Order Property of Multiplication) $4 \times 5 = 5 \times 4$

Associative Property of Addition (sometimes considered grouping) $(6 + 4) + 2 = 6 + (4 + 2)$

*Identity Property of Addition $3 + 0 = 3$

*Identity Property of Multiplication $3 \times 1 = 3$

Zero Property of Multiplication $3 \times 0 = 0$

* *Properties that are introduced in the third grade core.*

Intended Learning Outcomes

1. Demonstrate a positive learning attitude towards mathematics.
3. Reason mathematically.
4. Communicate mathematically.
5. Make mathematical connections.
6. Represent mathematical situations.

Instructional Procedures

Invitation to Learn

Place transparency of p. 7 (ants) from *Grapes of Math* on the overhead or recreate it using plastic ants. Read "Ant Attack" from p. 8 and encourage participants to quickly count the ants before they are removed. Talk about their strategies. Write the numeric expression that helped them count the ants.

Instructional Procedures

You may want to select a few properties to review such as the Commutative and Associative.

You may wish to review just the properties that have been learned during the multiplication unit. Make the lesson fit your needs at this time.

Distribute copies of the blackline master showing an array of triangles to the students. Ask how many triangles are in the array. Point out that there are many interesting ways to find the answer. The object of the rest of this activity will be not to count the individual 32 triangles, but to look for various patterns in the array and to translate the visual patterns into numeric equations. "In what ways will the Commutative, Associative, Identity, or Zero Properties help you when looking for patterns?"

Place a transparency copy of the blackline master on the overhead and discuss possible numeric expressions. (The participants might start with a simple one such as $1 + 3 + 5 + 7 + 7 + 5 + 3 + 1$.) Did anyone look for "doubles"? Did anyone "make tens"?

Can you find a 5×4 rectangle inside this array of triangles? How would you write the remaining numeric expression? $[(5 \times 4) + 4 + 4 + 2 + 2]$ or $(5 \times 4) + (2 \times 4) + (2 \times 2)$

Can demonstrate commutative property $20 + 4 + 4 + 2 + 2 = 2 + 2 + 4 + 4 + 20$. Can demonstrate associative property $(20 + 4 + 4) + 2 + 2 = 20 + (4 + 4 + 2 + 2)$.

Explore and record as many patterns as possible with your partner.

Record the numeric expression below the picture after it is partitioned.

Think of another way to write the numeric expression and record it.

Be able to defend your reasoning as to why the different numeric expressions have the same sum. Find ways of shortening numeric expressions.

F. Y. I. As I tried this activity with several classes, I found that the students wanted their own activity sheet. The resource students struggle with writing the numerical equation and may need extra help.

Curriculum Integration

Math/Science—Create your own simple array and exchange with a partner. How many different ways can the simple array be partitioned? Can you record the different numerical equations?

Extensions

Possible Extensions/Adaptations/Integration

Finish reading *The Grapes of Math* to the class. As a class, create a rhyming math puzzle and picture similar to the book. Talk about how it is created and how to find rhyming words. How would you give the clue in the last stanza? Ask students to work in groups to create a "group" rhyming math puzzle similar to the samples in *The Grapes of Math*. The group must also create a picture to support the puzzle. Combine the group puzzles to create a class book of "Mind-Stretching Math Riddles".

Homework & Family Connections

Take a new blackline copy and the completed "Pattern Search" copy. Have the student teach their parent three patterns and the correlating numeric equations. Together, they can discover another way to write the numeric equations or find another undiscovered pattern. The parent should write a comment to their child on the homework.

Assessment Plan

See rubric sample.

Authors

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