The Commutative Cookie

Summary

Students will illustrate multiplication problems using Unifix cubes.

Main Core Tie

Mathematics Grade 3

Strand: OPERATIONS AND ALGEBRAIC THINKING (3.OA) Standard 3.OA.5

Additional Core Ties

Mathematics Grade 3

Strand: OPERATIONS AND ALGEBRAIC THINKING (3.OA) Standard 3.OA.3

Materials

Unifix cubes
- Cookie Sheet Mat (pdf)
  (one per partner)
- *Cookie Sheet*
  overhead
- Cookie Sheet worksheet (pdf)
  Dice

Additional Resources

Books

- *The Grapes of Math*
  , by Greg Tang; ISBN 043921033X
- *Hershey's Milk Chocolate Multiplication Book*
  , by Jerry Pallotta, Rob Bolster, illustrator; ISBN 0439254124

http://www.matti.usu.edu (National Library of Virtual Manipulatives)

Background for Teachers

An array is a rectangular arrangement of objects in rows and columns. Arrays can be used to illustrate multiplication facts. Some multiplication facts create a square. Their products are called square numbers. Prime numbers can only be made in a rectangular array with one row or one column.

Intended Learning Outcomes

3. Reason mathematically.
5. Make mathematical connections.

Instructional Procedures

Invitation to Learn

Show pictures of rows and columns in the real world. Tell the students that rows and columns combined are called arrays. Ask the students to look for arrays in the classroom. Where could they find them at home? How about on the playground?

Instructional Procedures

Tell the students to imagine they work in a bakery. They have been asked to bake a dozen cookies. Ask them how many cookies are in a dozen. Then tell the students the manager of the

bakery wants the cookie dough to be organized on the trays in equal numbers of rows and columns, or in other words, arrays. How could the cookie dough be arranged on the cookie sheet? (Find all possibilities.)

Have the students work in pairs or individually with paper *Cookie Sheet Mats* and Unifix cubes (representing cookie dough).

Ask for the results of their findings to be shared with the class. As each way is suggested, show the students how to write this as a multiplication problem. Also, switch the order of the factors. For example, when three rows of four is suggested (3 x 4) ask the students if four rows of three (4 x 3) is the same number of cookies. Rotate the array to show four rows of three. Tell them that multiplication factors can trade places like this without changing the total. This is called the commutative property of multiplication.

Ask the students, "What if the manager wanted us to bake 16 cookies, what would that look like?"

For more guided practice as a group or in partners, roll a pair of dice to give you two factors to work with. Have the students show the two arrays for those factors on their *Cookie Sheets Mats* . Then, have them work individually with the *Cookie Sheet worksheet* and dice.

Extensions

Have the students write in a learning journal about the commutative property of multiplication and explain how it works.

The gradual release structure of this lesson lends itself well to accommodations for students with special needs. Give more time for partners to work with the dice and cookie sheet mats when needed rather than individual practice.

Family Connections

Have the students look for arrays at home. Draw these and record the multiplication facts illustrated. Show the corresponding fact using the commutative property.

Families can make a batch of cookies at home arranged in arrays. Or, what else can be cooked in an array? Try something and report your findings.

Assessment Plan

Have the students write a paragraph explaining why multiplication facts can switch the factor's places and still get the same answer (commutative property).

Authors

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