Arrays/Area Model (3-5)

$$4 \times 11 = 44$$

Arrays are useful tools to build an understanding of both multiplication and division of whole numbers as well as multiplication of fractions in 5th grade. Arrays can also be used to demonstrate the Commutative Property of multiplication, the Distributive property of multiplication, and the relationship between multiplication and division (inverse operations). Students progress from using closed arrays to arrays that base 10 area pieces with linear pieces and open arrays. Using visual models provides a foundation that will allow students use the traditional method to solve multiplication and division problems with understanding, instead of just following a set of steps.
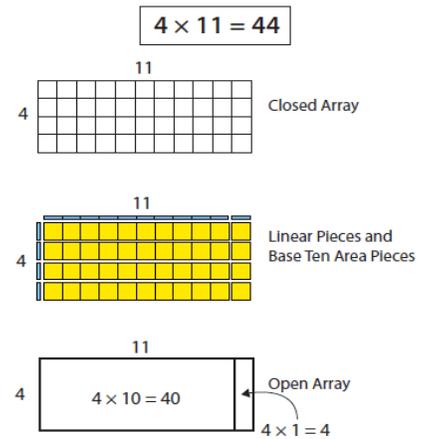
Using the Arrays

A closed array is formed by arranging a set of objects into rows and columns. The numbers being multiplied correspond to the dimensions of the rectangle (rows and columns) and the product corresponds to the area of the rectangle. With closed arrays the students count each square unit by ones.

Base 10 area pieces and linear pieces are used when numbers get larger. The area is modeled in bigger chunks of 10's and 1's, and the dimensions are defined with the linear pieces, helping students differentiate between linear measures and area measures. For multiplication, student place the linear pieces down to represent the factors and fill in the rectangle with the base ten pieces to find the product. For division, students place base ten pieces down to represent the dividend, linear pieces to represent the divisor and determine what linear pieces will be needed to find the quotient.
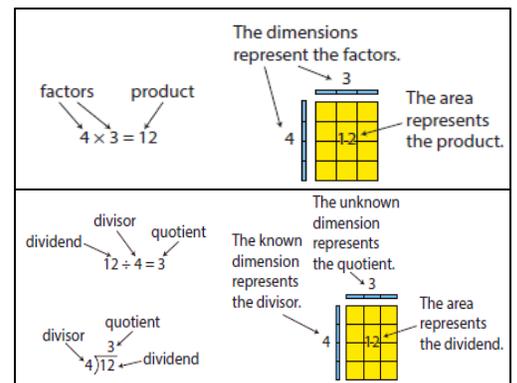
Open Arrays are similar to Base ten arrays. With this model, students do not have to chunk numbers into 10's and 1's. They can instead chunk the numbers in a way that makes the problem easier to them. This means that children can use their known number facts to work out calculations.

Activities to do with Arrays

- Propose a multiplication or division problem to your student. Have them draw or build an array to solve it and explain their thinking to you.
- "Written Multiplication Game": http://www.bbc.co.uk/skillswise/maths/games?page=3
- Math Tappers App: https://itunes.apple.com/us/app/mathtappers-multiples-math/id371520443?mt=8

The Free App

Download Number Pieces App: http://catalog.mathlearningcenter.org/apps

Watch video on how to use the App: http://www.mathlearningcenter.org/blog/number-pieces-app-0