

## Grade 3

### Multiplication Strategies

#### Array Model, Groups of and Repeated Addition

##### *MACCSS Standards Being Addressed:*

3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem

3.OA.5 Apply properties of operations as strategies to multiply and divide.

*Example: if  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative Property of Multiplication)*

##### *Rationale:*

Students create a concrete model of real-life multiplication situations. They experiment with reasons to use multiplication. Students reason with the idea that situations that require multiplication involve using equal groups and the size of the group, or a number of rows and columns.

## Using Arrays to Show Multiplication Concepts

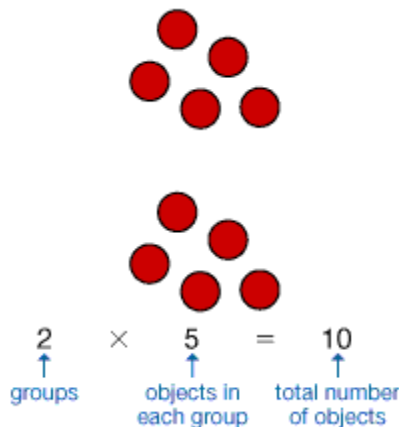
Students can more readily develop an understanding of multiplication concepts if they see visual representations of the computation process. For example, they can picture chairs set up in rows in an auditorium for a presentation or buying a case of water from the store. These arrangements have something in common; they are setup in rows and columns. An arrangement of objects, pictures, or numbers in columns and rows is called an **array**. Arrays are useful representations of multiplication concepts.

This array has 3 rows and 7 columns. It can also be described as a 3 by 7 array.

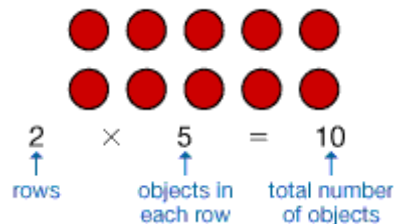


Notice that the rows in the array are equal. If you think of the rows as equal groups, the problem could be represented as repeated addition (a second grade concept). So, 3 groups of 7 can be represented by  $7 + 7 + 7 = 21$  and students learn this can also be represented by  $3 \times 7 = 21$ .

The following example shows a situation where the problem can be represented as equal groups of objects.

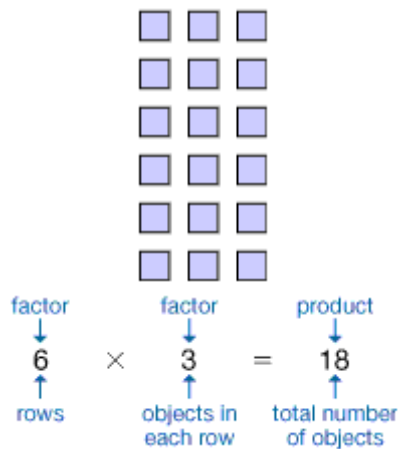


When equal groups are arranged in equal rows, an array is formed.



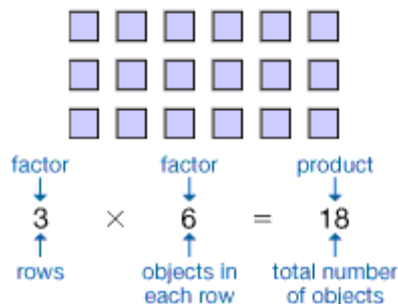
When students are shown the connection between equal groups and arrays, they can easily understand how to use arrays to multiply. They will use arrays again later to divide.

Look at the multiplication sentence that describes the array below. The numbers in multiplication sentences have special names.



The numbers that are multiplied are called factors. The answer is called the product.

Now look at what happens to the factors and product in the multiplication sentence when the array is turned on its side.



The order of the factors changed, but the product stayed the same. (Please note: The order of the factors must match the rows and columns of the array). When the order of the factors in any multiplication sentence changes, the product does not change and this is called the Commutative Property of Multiplication. Students should be familiar with the Commutative Property because it also applies to addition. Knowing the Commutative Property helps students realize they only need to know about half of the multiplication facts. For example, if they know  $8 \times 5 = 40$ , then they also know  $5 \times 8 = 40$ .

We will use this knowledge for learning and remembering division facts as well.

Adapted from [http://www.eduplace.com/math/mw/background/3/05/te\\_3\\_05\\_overview.html](http://www.eduplace.com/math/mw/background/3/05/te_3_05_overview.html)