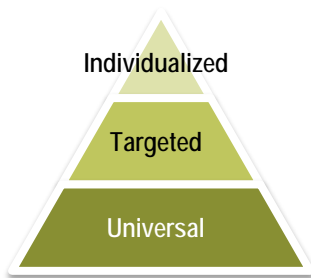# Arrays

Strategies that make a difference

An array is a set of numbers or objects arranged in rows and columns. It can be used for multiplying, dividing, and solving quadratic equations. Arrays provide a quick and efficient way to count things and play an important role in being able to concretely express concepts.

Individualized
Targeted
Universal

A teacher's understanding of their students' learning needs helps determine when to provide universal, targeted, or individualized instructional strategies. For some students, universal instructional strategies may be enough to meet their learning needs. For others, more targeted instructional strategies are the starting point for implementing the curriculum. The strategy described is a guideline that teachers can use depending on the learning context.

Why use this strategy in an inclusive learning environment

- Helps students develop a conceptual understanding of computational processes.
- Arrays provide a visual representation of multiplication as repeated addition.
- Provides a knowledge base that can be used later with polynomial multiplication.

How this strategy could be used in an inclusive learning environment

1. Use concrete examples of arrays, such as a box of chocolates or a carton of eggs, and ask students what they notice about them. Discuss how the chocolates or eggs are arranged (for example, two rows of six).

2. Present an array using concrete objects such as fruit, desks, or chairs and have students organize them in rows and columns. Have students note that each row and column have the same amount in them. The following array with two rows and three columns could represent the number sentence (or equation) 2 x 3 = 6:

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3. Explore arrays further by using manipulatives before moving on to more abstract representations. Have students create their own arrays.

4. Have students explore arrays in abstract forms by using grid paper and shading in a given area.

5. To move from a more concrete representation (tokens) to a symbolic (numerical) example, use an array without the grid lines. For example, to represent 15 x 12:

	10	2
10	100	20
5	50	10

$15 \times 12 = (10 \times 10) + (10 \times 2) + (5 \times 10) + (5 \times 2)$
$\quad\quad = \quad 100 \quad + \quad 20 \quad + \quad 50 \quad + \quad 10$

$\quad\quad = \quad \mathbf{180}$

6. To multiply binomials, arrays can also be used. For example, to multiply $(x + 3)(x - 2)$:

	x	+3
x	x^2	3x
-2	-2x	-6

$(x + 3)(x - 2)$

$= (x \bullet x) + (x \bullet 3) + (-2 \bullet x) + (-2 \bullet 3)$
$= x^2 + 3x - 2x - 6$
$= x^2 + x - 6$

Tips for individualized supports

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- Provide several concrete examples and determine student understanding of the concept before moving on to abstract representations.

- Provide students with guided opportunities to create arrays in different arrangements to reinforce understanding.

- Consider providing an example with one element missing from the number sentence or equation to practice completing the array.

- Use larger grids to assist students with, for example, differing fine motor abilities, or vision impairments.

- Use software or websites to illustrate how arrays work and how changing the amount in the rows or columns affects the answer.

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