

Home Connections in Mathematics

Supporting the Understanding of Multiplication and Division

Understanding the meaning of multiplication and division is essential for success in mathematics. When we multiply, we can think about 'groups of' or 'copies of' the same number. Organizing items into rows and columns allows students to build and see their multiplication facts; we call this type of organization an 'array'. By organizing concrete objects into a rectangular shape, it is easier to see the groups. Many things in the real world are organized this way to determine the quantity easily with multiplication.



Arrays make it clear to see why 3×4 is the same as 4×3 . Knowing this relationship allows students to reduce the number of facts that they need to know.

The array is very powerful because it also shows students how to divide. From a single array, 4 operation statements can be determined.



This array of donuts shows:

$$4 \times 3 = 12 \quad 12 \div 4 = 3$$

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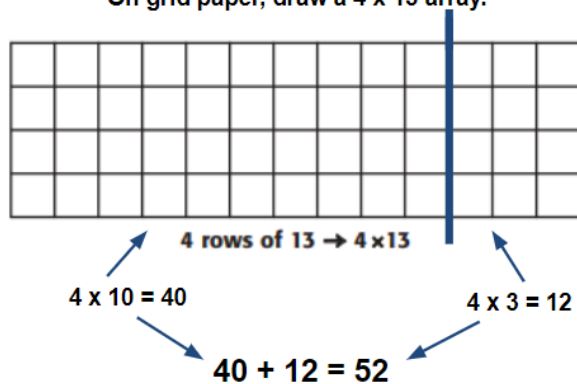
Arrays also provide a great opportunity to count by different numbers. The donut array can be counted by 3's and 4's. Children can count the donuts by saying, "3, 6, 9, 12" or "4, 8, 12". Counting on a regular basis by numbers other than 1 allows children to be more efficient in determining their facts and explore different number patterns.

Arrays can also show fractions of a number. The donut array makes it easy to see that $\frac{1}{4}$ of 12 is 3 and $\frac{3}{4}$ of 12 is 9 by looking at the vertical rows.

By noticing and naming arrays wherever you see them, children can see multiplication in the world around them. They can also understand the connection between multiplication and division.

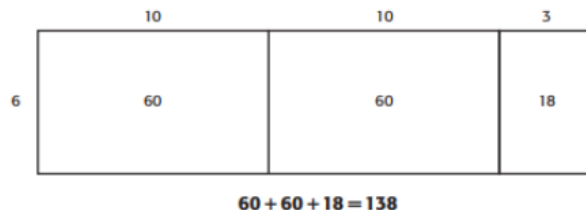
When the numbers in multiplication get larger, children can move from organizing concrete objects to using grid paper. By drawing the rectangles on centimetre grid paper, they are also drawing and determining the areas of a rectangle. The grid can be split up to make finding the area easier.

On grid paper, draw a 4×13 array.



Eventually, children can create proportional drawings that represent their multiplication without the grid.

6×23



Multiplying with arrays helps students to break up multiplication into parts that can be added together. In the above array, 23 groups of 6 is broken up into 10 groups of 6, 10 groups of 6 and 3 more groups of 6. Flexibility in breaking up multiplication allows students to multiply together easier numbers to find the total.

The same process can be extended into double and triple digit multiplication. This method ensures that children are multiplying with meaning, and not starting with memorizing a procedure. Increased understanding of multiplication leads to increased fluency of multiplication facts. For more information on the area model of multiplication, go to :

<https://www.youtube.com/watch?v=Sfi4QUIQ4co>