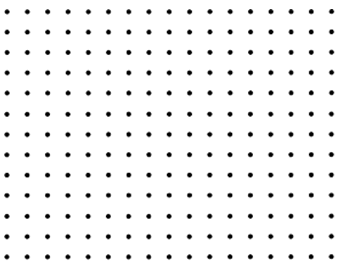
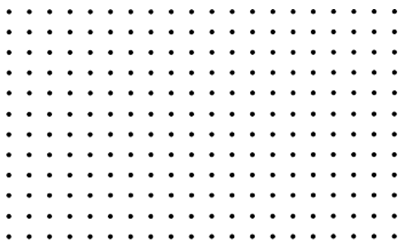
**The Geometry of Number (Multiplication)**

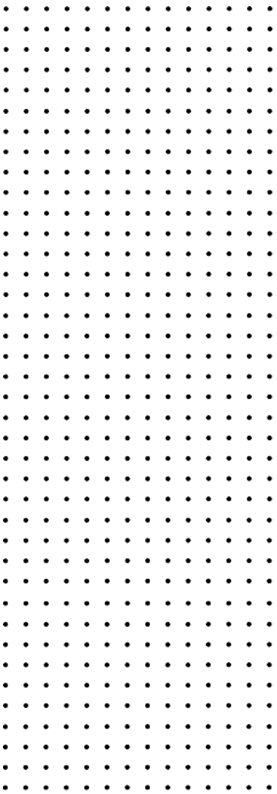
1. Discovering and finding other ways to do 13 X 17 = \_\_\_\_\_\_\_\_\_\_\_

****

1. 12 X 20 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

****

1. Determine an efficient way to determine the number the dots and show how you would group dots to make it efficient.

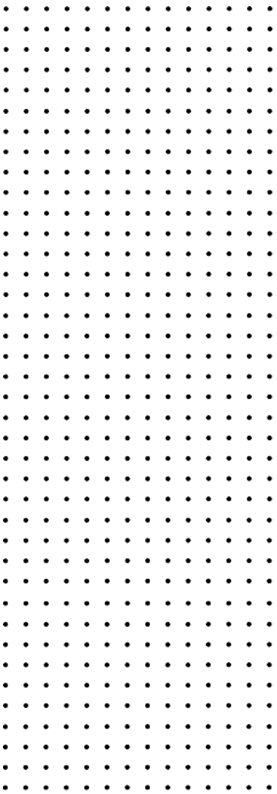


**Connect Dot Arrays to Multiplication with Base Ten Blocks**

Re-present the previous problems using Base 10 blocks or Base 10 block drawings.

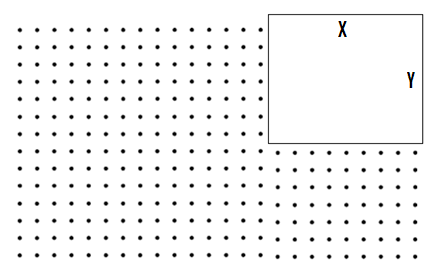
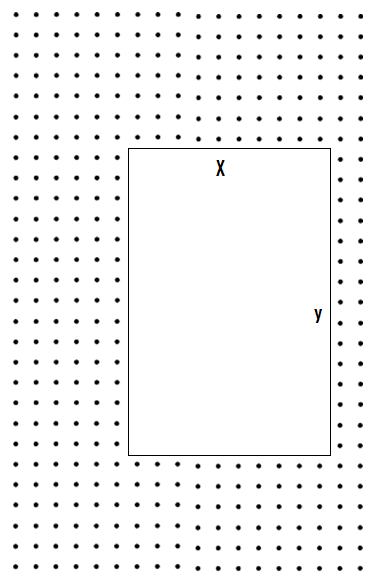
**Connecting it to the Standard Algorithm**

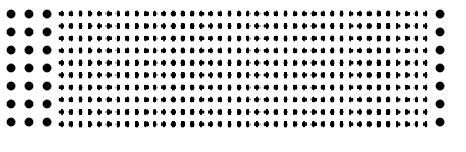
For problem 3, draw comparisons between the partial products and Standard Algorithm. Explain below.



**Algebra: Extending Multiplicative Representation**

For the following dot arrays someone covered up part of the arrays with a piece of paper. Find the number of missing dots by at least 2 different methods and explain how you can know how many dots long X and Y are:

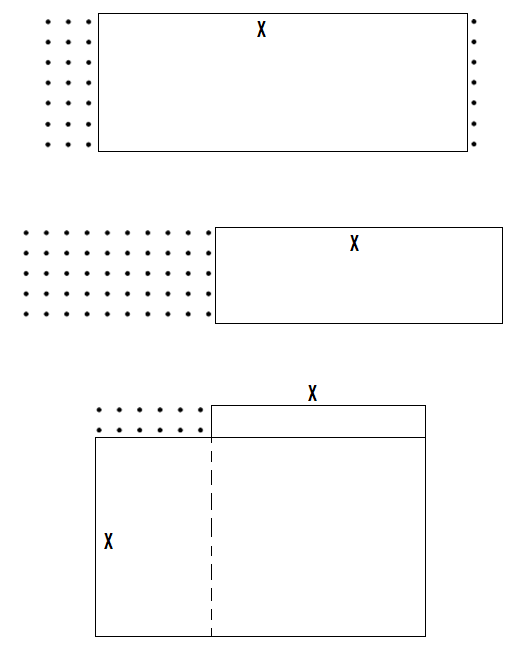
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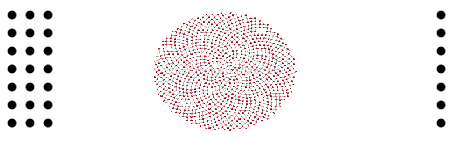
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**Algebra: Unknowns in representing multiplication and juxtaposition.**

In the following situations some of the dots of an array have been covered up. How many dots are there? Represent the solutions as best you can with a multiplicative expression and state any assumptions you must make. Challenge: Try to represent it in more than 1 way.



****

**Multiplication Algorithm’s**  Factor \* Factor = Product

Partial Products Algorithm Standard Algorithm Equal Ratio’s

47 47 28

x 2 x 2 x 5

43 43

x 32 x 32

Is there any connection to Algebra and Expressions in the Partial Products and Standard Algorithms?

Lattice Multiplication

a) 47 x 2 = ? b) 43 x 32 = ? c) 423 x 52