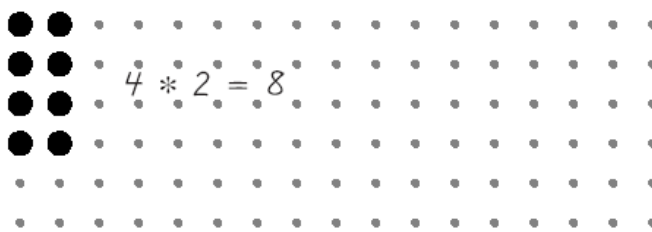


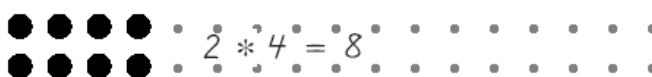
A **rectangular array** is an arrangement of objects into rows and columns. Each row has the same number of objects and each column has the same number of objects.

We can write a multiplication **number model** to describe a rectangular array.

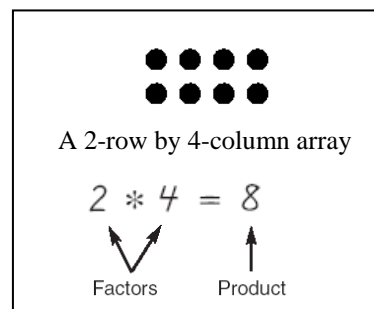
This is an array of 8 dots.
 It has 4 rows with 2 dots in each row.
 It has 2 columns with 4 dots in each column.



This is another array of 8 dots.
 It has 2 rows with 4 dots in each row.
 It has 4 columns with 2 dots in each column.



$2 \times 4 = 8$ is the number model for the 2-by-4 array.
 8 is the **product** of 2 and 4.
 2 and 4 are whole number **factors** of 8.
 2 and 4 are a **factor pair** for 8.
 1 and 8 are also factors of 8 because $1 \times 8 = 8$.
 1 and 8 are another factor pair of 8 because $1 \times 8 = 8$.

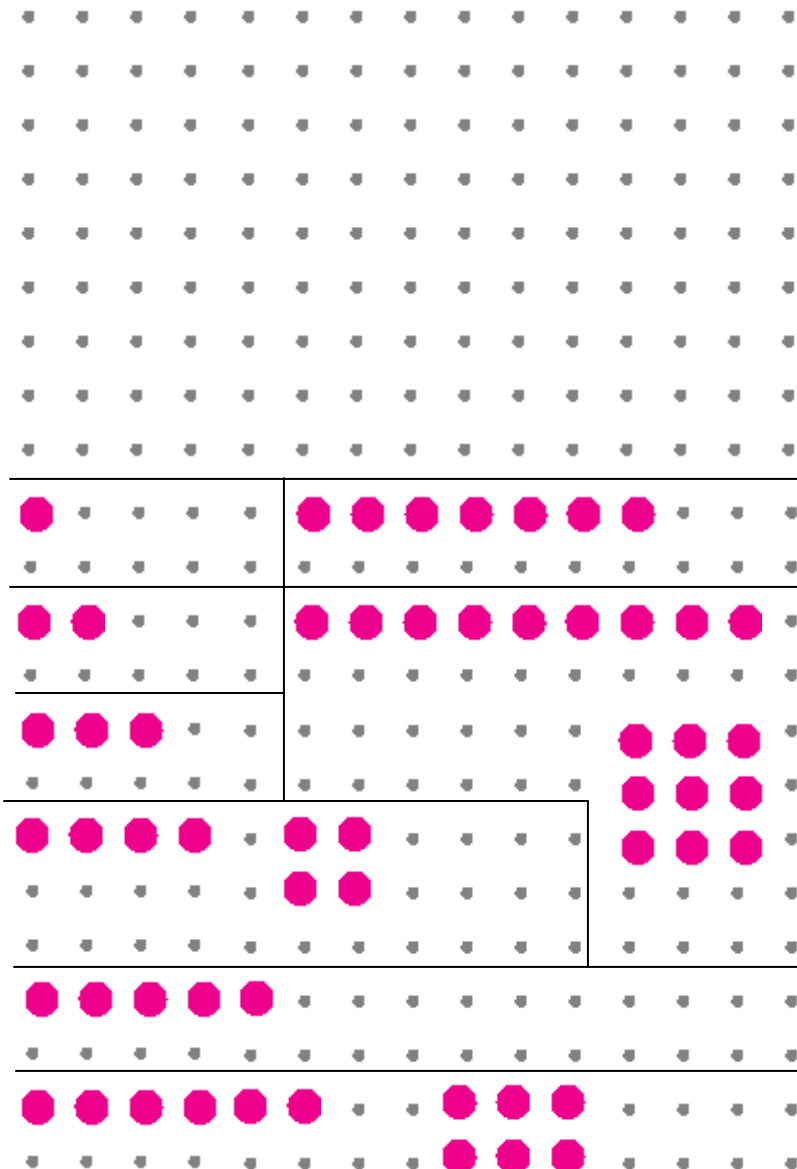


1. a. Take 10 counters. Make as many different rectangular arrays as you can using 10 counters.
- b. Draw each array on the grid at the right by marking dots
- c. Write the number model next to each array.
- d. List all the whole-number factors of 10.

e. How many factors does 10 have? _____

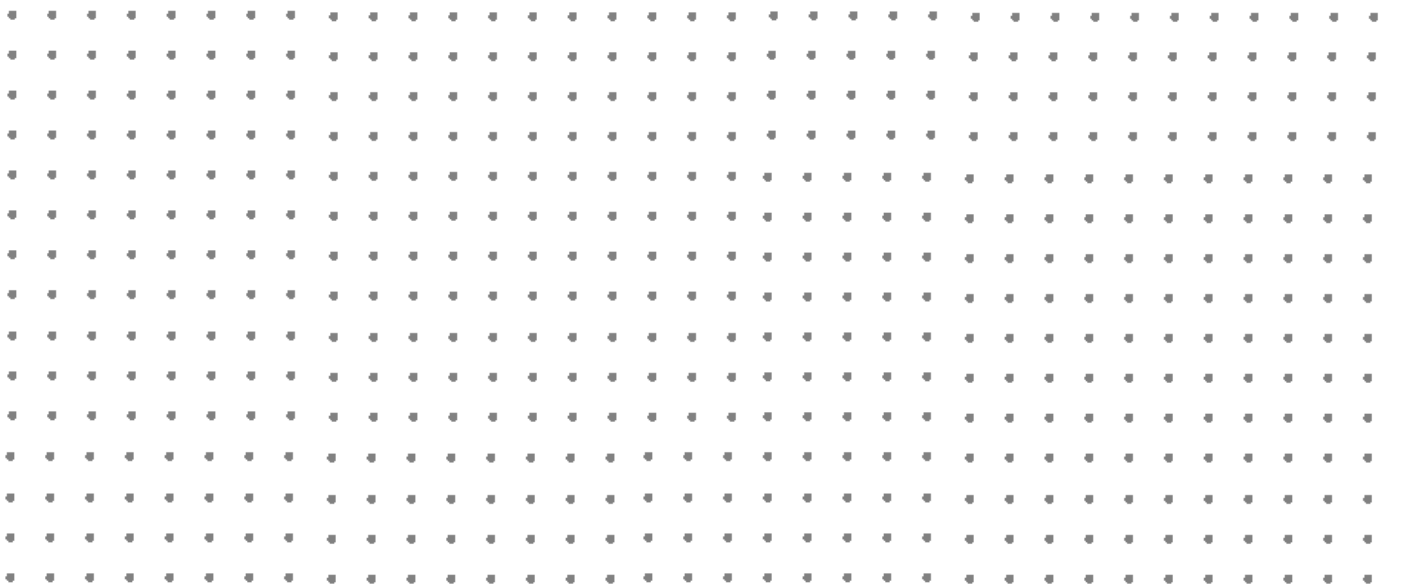
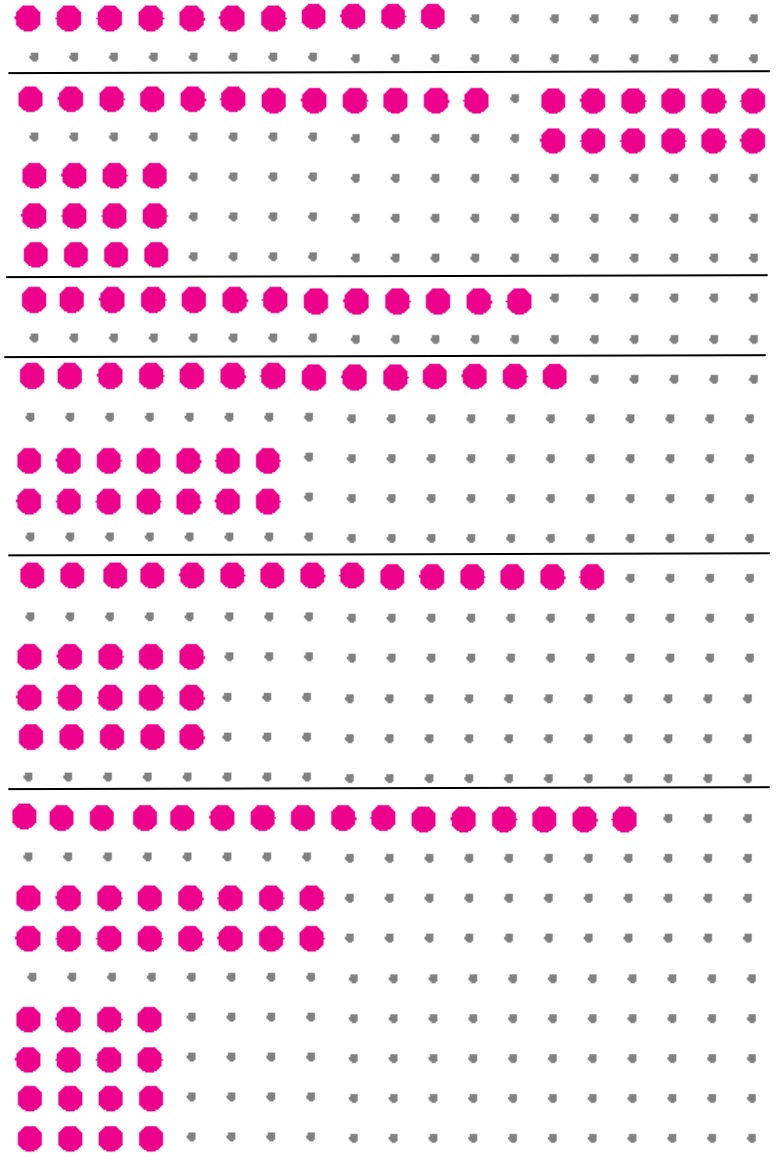
2. Rectangular arrays are shown on the grid. (Since a 1-by-2 array and a 2-by-1 array do not produce any new information, we need not draw them both.) Complete the entries in the table. For the last row, use the information above.

Number	Number Models with 2 Factors	All Possible Factors	Number of Factors
1	1×1		
2	1×2		
3	1×3		
4	$1 \times 4, 2 \times 2$		
5	1×5		
6			
7			
8			
9			
10			



2. Make as many different rectangular arrays as you can for the number in the first column to complete the table. You can also use **factor trees** to help you.

Number	Number Models with 2 Factors	All Possible Factors	Number of Factors
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			



Below each number listed across the top, we identify natural numbers (from 1 to 37) that have that number of factors. For example, 4 is in the 3 column because 4 has three factors: 1, 2, and 4.

1	2	3	4	5	6	7	8	9
1	2	4	6	16	12		24	36
	3	9	8		18		30	
	5	25	10		20			
	7		14		28			
	11		15		32			
	13		21					
	17		22					
	19		26					
	23		27					
	29		33					
	31		34					
	37		35					

1. What patterns do you see forming?
2. Will there be any other entries in the 1 column? Why?
3. What are the next three numbers in the 3 column?
4. Find an entry for the 7 column.
5. What kinds of numbers have an odd number of factors? Why?