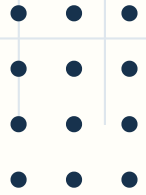
Counting rectangles — Grids up to 12 dots

Name: _____ Date: _____

Count the rectangles you can make from a grid of dots, and show why it is a product of two combinations.

1 A pegboard holds its pegs in a rectangle 3 pegs across and 4 pegs down — 12 pegs altogether. A rectangle is any four pegs that make its corners, sides along the rows and columns.



How many rectangles are there?

Why A rectangle with sides on the grid is pinned down by 2 of the 3 columns — its left and right edges — and 2 of the 4 rows — its top and bottom. The columns give C(3,2) = 3, the rows give C(4,2) = 6, and every pair of columns goes with every pair of rows: 3 × 6 = 18. So 18 rectangles, not the 6 little cells you get by counting only the smallest squares.

18

2 A park has lamp posts in a grid 2 across and 6 deep, 12 lamps in all. A rectangle has four lamps as corners with its sides running along the rows and columns.

How many rectangles are there?

Why

Name: _____ Date: _____

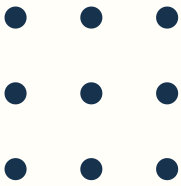
Count the rectangles you can make from a grid of dots, and show why it is a product of two combinations.

3 A park has lamp posts in a grid 2 across and 3 deep, 6 lamps in all. A rectangle has four lamps as corners with its sides running along the rows and columns.

How many rectangles are there?

Why

4 A pegboard holds its pegs in a rectangle 3 pegs across and 3 pegs down — 9 pegs altogether. A rectangle is any four pegs that make its corners, sides along the rows and columns.



How many rectangles are there?

Why

Counting rectangles · Grids up to 12 dots — Answer key

If they are stuck

- A rectangle is two columns and two rows. Count the ways to choose each, and multiply — do not just count the little cells.

1. A rectangle with sides on the grid is pinned down by 2 of the 3 columns — its left and right edges — and 2 of the 4 rows — its top and bottom. The columns give C(3,2) = 3, the rows give C(4,2) = 6, and every pair of columns goes with every pair of rows: 3 × 6 = 18. So 18 rectangles, not the 6 little cells you get by counting only the smallest squares.

2. A rectangle with sides on the grid is pinned down by 2 of the 2 columns — its left and right edges — and 2 of the 6 rows — its top and bottom. The columns give C(2,2) = 1, the rows give C(6,2) = 15, and every pair of columns goes with every pair of rows: 1 × 15 = 15. So 15 rectangles, not the 5 little cells you get by counting only the smallest squares.

3. A rectangle with sides on the grid is pinned down by 2 of the 2 columns — its left and right edges — and 2 of the 3 rows — its top and bottom. The columns give C(2,2) = 1, the rows give C(3,2) = 3, and every pair of columns goes with every pair of rows: 1 × 3 = 3. So 3 rectangles, not the 2 little cells you get by counting only the smallest squares.

4. A rectangle with sides on the grid is pinned down by 2 of the 3 columns — its left and right edges — and 2 of the 3 rows — its top and bottom. The columns give C(3,2) = 3, the rows give C(3,2) = 3, and every pair of columns goes with every pair of rows: 3 × 3 = 9. So 9 rectangles, not the 4 little cells you get by counting only the smallest squares.