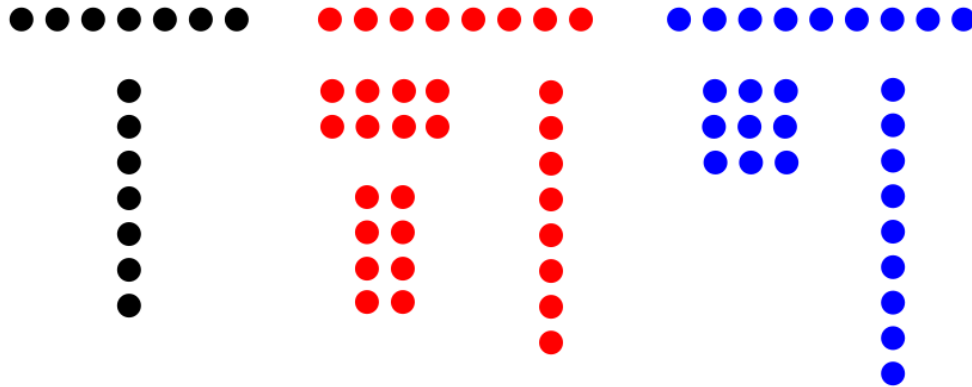


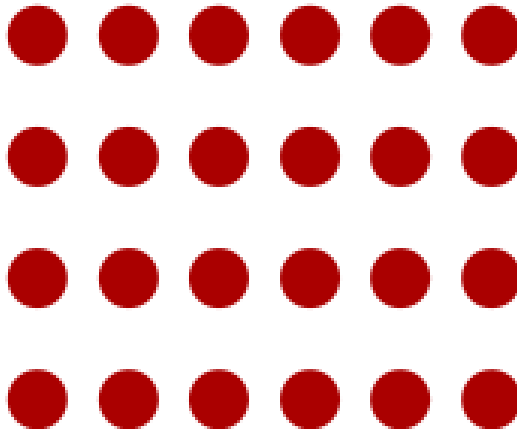
Puzzle of the Week

Rectangle Shapes

Here are all the rectangles that can be made with 7, 8, and 9 dots.



THE CHALLENGE: What are all the rectangles you can make with 23, 24, 25, 26, and 27 dots? How many different shapes of rectangles can you make with each of these sizes?



EXPLORATION: Which types of numbers have exactly two rectangles, both of which are flat? Which numbers have exactly three rectangles?

Puzzle of the Week

Rectangle Shapes – Notes

THE CHALLENGE: Each rectangle represents one way to factor the number. The number of rectangles will be the number of divisors of the number.

Here are the factorings (= rectangles) for each number.

- 23: 1×23 , 23×1
- 24: 1×24 , 2×12 , 3×8 , 4×6 , 6×4 , 8×3 , 12×2 , 24×1
- 25: 1×25 , 5×5 , 25×1
- 26: 1×26 , 2×13 , 13×2 , 26×1
- 27: 1×27 , 3×9 , 9×3 , 27×1

EXPLORATION: The numbers with exactly two factorings are the prime, such as 7 and 23. They can be factored as having just one row or just one column.

The numbers with exactly three factorings are squares of primes, such as 9 and 25. In addition to the two flat rectangles, they have one more that is a square that has the prime number of dots on each side.

There is a lot more that can be done to count divisors. For example, it is very easy to count the divisors of prime powers. For example, 5 to the 10th power will have 11 divisors - one for each power of 5 from 0 to 10.

There is a lot more exploration of divisors that is possible for the interested student.