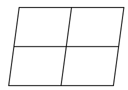
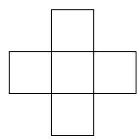
## Warm-Up!

Try these problems before watching the lesson.

1. In the figure shown, there are parallelograms of many sizes. How many total parallelograms are there in the diagram?



2. Each of the five numbers 1, 5, 9, 13, and 17 is placed in one of the five squares so that the sum of the three numbers in the horizontal row equals the sum of the three numbers in the vertical column. What is the largest possible sum of the three numbers in the horizontal row?

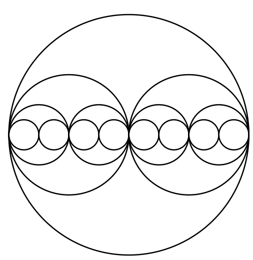


3. Jamie has 2 dimes, 4 nickels and 8 pennies. In how many different ways can she make 26 cents?

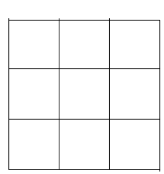
4. How many ordered triples $(x, y, z)$ of positive integers have the property that $x+y+z=6$?

## The Problems

**First Problem:** Using the figure of 15 circles shown, how many sets of three distinct circles $A$, $B$ and $C$ are there such that circle $A$ encloses circle $B$, and circle $B$ encloses circle $C$?

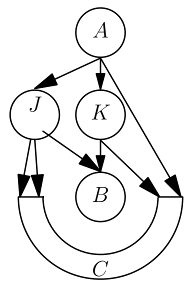


**Second Problem:** How many ways are there to arrange the digits 1 through 9 in this $3 \times 3$ grid, such that the numbers are increasing from left to right in each row and increasing from top to bottom in each column?

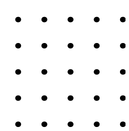


## Follow-up Problems

5. Regions $A, B, C, J$ and $K$ represent ponds. Logs leave pond $A$ and float down flumes (represented by arrows) to eventually end up in pond $B$ or pond $C$. On leaving a pond, the logs are equally likely to use any available exit flume. Logs can only float in the direction the arrow is pointing. What is the probability that a log in pond $A$ will end up in pond $B$? Express your answer as a common fraction.




6. The dots in the grid below are equally spaced vertically and horizontally, with each dot 1 unit from its closest neighbors. How many different squares of any size can be formed by connecting four of the dots in the grid?



7. How many collections of six positive, odd integers have a sum of 18? Note that the sums $1+1+1+3+3+9$ and $9+1+3+1+3+1$ are considered to be the same collection.

8. Each of the integers $1, 2, 3, 4, \ldots, 16$ is written on a separate slip of paper and these slips are placed in a pile. Jillian will randomly draw slips from the pile without replacement and will continue drawing until two of the numbers she has drawn from the pile have a product that is a perfect square. What is the maximum number of slips that Jillian can draw without obtaining a product that is a perfect square?

## Share Your Thoughts

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).