Activity Sheet for the October, 2018, MATHCOUNTS Mini

Warm-Up!

Try these problems before watching the lesson.

1. Find the missing terms in each of the following arithmetic sequences:

   (a) $5, 11, \_\_, \_\_, \_\_$
   (b) $\_\_, \_\_, \_\_, 5, 11$
   (c) $5, \_\_, \_\_, \_\_, 11$

2. In how many ways can 45 cents be made using any combination of quarters, dimes, and nickels?

3. How many four-digit numbers have exactly one 0?

4. A dresser has five drawers stacked vertically. To be able to reach the contents in an open drawer, the drawer that is directly above the open drawer may not be open at the same time. In how many ways can one or more drawers be open so that the contents in each of the open drawers can be reached?

The Problems

First Problem: An ordinary 3-by-3 magic square contains every positive integer from 1 through 9, with one integer per cell, such that the sums of the numbers in each row, each column and each diagonal are the same. When the ordinary magic square shown is completed, what is the sum of all the possible values of x?

	x	
	5	
		$x+1$

Second Problem: The three-digit numbers $C99$, $A6A$, $BC7$ and $B91$ form an arithmetic sequence in this order. What is the value of $A^2 + B^2 + C^2$?

MATHCOUNTS®
Minis
www.mathcounts.org

presented by
Art of Problem Solving
www.artofproblemsolving.com

Follow-up Problems

5. Ashley, Brett, Chris, and Diane are competing in a race. Eric sees the race and comments,

   (1) "Ashley beat both Brett and Chris"

   (2) "Diane finished between Brett and Chris"

   If exactly one of Eric's statements is correct and there were no ties, how many different orders of finish are possible?

6. 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.
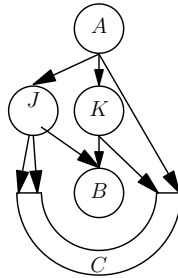
7. Each of the integers $1, 2, 3, 4, \ldots, 16$ is written on a separate slip of paper and these slips are placed in a pile. Jillian will randomly draw slips from the pile without replacement and will continue drawing until two of the numbers she has drawn from the pile have a product that is a perfect square. What is the maximum number of slips that Jillian can draw without obtaining a product that is a perfect square?

8. A bag contains ten identical blue marbles and ten identical green marbles. In how many distinguishable ways can five of these marbles be put in a row if there are at least two blue marbles in the row and every blue marble is next to at least one other blue marble?

Wow! 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).