Activity Sheet for the February, 2016, MATHCOUNTS Mini

☀ Warm-Up!

Try these problems before watching the lesson.

1. How many different five-letter "words" can be formed from the letters in the word "HOOPS" if the two O's must be consecutive?

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

3. In one roll of three standard, six-sided dice, what is the probability of rolling three different numbers? Express your answer as a common fraction in simplest form.

4. If a ladybug walks on the segments of the diagram from point A to point B moving only to the right or downward, how many distinct paths are possible?
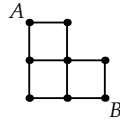
🧩 The Problems

First Problem: Each of the 25 cells in a five-by-five grid of squares is filled with a 0, 1 or 2 in such a way that the numbers written in neighboring cells differ from the number in that cell by 1. Two cells are considered neighbors if they share a side. How many different arrangements are possible?

Second Problem: The doctor gave Amber ten vitamins, with instructions to take one or two each day until she runs out of vitamins. For example, Amber could take a vitamin a day for ten days, or she could take two the first day and one a day for the next eight days. A third way is to take one vitamin a day for eight days and two on the ninth day. Including the three examples given, in how many different ways can Amber take the ten vitamins?

MATHCOUNTS®
Minis
www.mathcounts.org

presented by
Art of Problem Solving
www.artofproblemsolving.com

Follow-up Problems

5. How many 4-digit positive integers are there such that no two consecutive digits are equal?

6. A *palindrome* is a number that reads the same forwards as backwards, such as 345676543. How many 7-digit palindromes are there?

7. Seven students sit in a row of 7 chairs. Ben insists on sitting next to Amy, and Carol insists on sitting next to Dave. In how many ways can the seven students be seated?

8. How many ways can all **seven** numbers in the set $\{4, 3, 2, 8, 12, 1, 6\}$ be ordered so that a comes before b whenever a is a divisor of b?

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).