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Activity Sheet for the December, 2016, MATHCOUNTS Mini

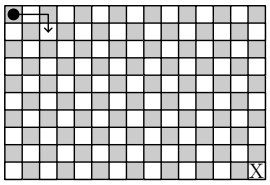
Warm-Up!

Try these problems before watching the lesson.

1. What is the maximum number of non-overlapping regions that can be determined by three lines in a plane?
2. What is the least possible sum of two positive integers whose product is 182?
3. If x and y are perfect squares such that $x+y = 65$ and $x > y$, what is the least possible value of $x - y$?
4. If x and y are positive integers, and the mean of 4, 20 and x is equal to the mean of y and 16, what is the smallest possible value of $x + y$?

The Problems

First Problem: Initially, a chip is placed in the upper-left corner square of a 15×10 grid of squares as shown. The chip can move in an L-shaped pattern, moving two squares in one direction (up, right, down or left) and then moving one square in a corresponding perpendicular direction. What is the minimum number of L-shaped moves needed to move the chip from its initial location to the square marked "X"?



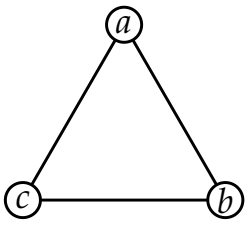
Second Problem: A, B, C, D and E in the decimal representations 0.ABC and 0.DE represent the digits 1, 2, 3, 4 and 5, in some order. What is the least possible absolute difference between 0.ABC and 0.DE?

Follow-up Problems

5. If $2015 + a = b$ for positive integers a and b, both of which are palindromes, what is the smallest possible value of a?

6. Six positive integers have a mean of 6. If the median of these six integers is 8, what is the largest possible value of one of these six integers?

7. Replace a, b and c with three different positive integers so that the sum of the two numbers along each side is a perfect square. What is the smallest possible value of the sum $a + b + c$?



8. During a game of paintball, ten friends were positioned in a field so that no two of them stood the same distance apart. Each person aimed at his or her closest opponent, and at the signal everyone fired. What is the maximum number of times one player could have been hit?

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).