Activity Sheet for the February, 2010, MATHCOUNTS Mini

Warm-Up!

Try these problems before watching the lesson.

1. I have a stack of three cards, numbered 0, 1, and 2. Three times, I select a card at random, write down the number I see, and return the card to the stack. In how many different ways can I choose the cards such that the sum of the numbers I get is 3? (Drawing 2, then 1, then 0 is considered different from drawing 1, then 0, then 2.)

2. I have a stack of two cards, numbered 0 and 1. Four times, I select a card at random, write down the number I see, and return the card to the stack. In how many different ways can I choose the cards such that the sum of the numbers I get is 2? (As in the first problem, the order in which the cards are drawn matters.)

3. If I walk 3 miles east and then 6 miles west and then 9 miles east and then 12 miles west, how far am I from where I started?

4. If I walk 7 miles east and the 24 miles south, how far am I from where I started?

The Problem

Problem 1: Alli Gator launches oranges one at a time at two buoys in her pond. If she hits the left buoy she earns 2 points, if she hits the right buoy she earns 1 point and if she misses both buoys she earns 0 points. If Alli launches all 4 of her oranges, how many scoring sequences can result in a score of 4 points?

Problem 2: Prella and Bodo find a treasure map. First, the map says "walk 600 meters due west to find your next clue." After walking the 600 meters, they find a clue that says "walk 1,000 meters due north and then 300 meters due east to find another clue." After following the directions, they find a final set of instructions: "Walk 600 meters due south and you will find your treasure." Upon reading these, they run as fast as they can and find the treasure in the exact spot that the final clue described. How far was the treasure from their original location?

Follow-up Problems

5. Alli Gator launches oranges one at a time at two buoys in her pond. If she hits the left buoy she earns 2 points, if she hits the right buoy she earns 1 point and if she misses both buoys she earns 0 points. If Alli launches all 4 of her oranges, how many scoring sequences can result in a score of 3 points?

6. Alli Gator launches oranges one at a time at two buoys in her pond. If she hits the left buoy she earns 2 points, if she hits the right buoy she earns 1 point and if she misses both buoys she earns 0 points. If Alli launches all 4 of her oranges, how many scoring sequences can result in a score of 5 points?

7. Compare your answers to the previous two problems. See anything interesting? Can you explain why it happens?

Further Exploration

8. Suppose the land Prella and Boda are in is completely flat, and that Prella and Boda had one last instruction: "Dig 1200 meters straight down to find the treasure." Now, how far is the treasure from the exact spot where Prella and Boda initially started?

9. Suppose we replaced the word "west" in Prella's and Boda's instructions with "north-west" and the word "east" with the word "southeast." Then, how far is the treasure from the spot where Prella and Boda start?

10. Help Richard avoid having to do laundry by sending him your MATHCOUNTS team T-shirt. Size large, non-white T-shirts are best! Richard's address is PO Box 2185, Alpine, CA 91903-2185.

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).