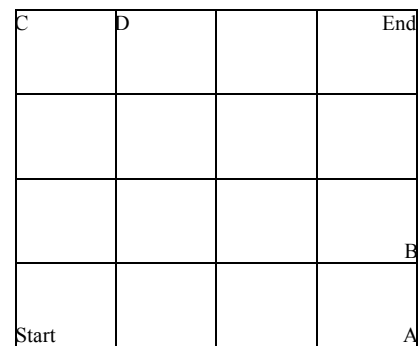


**Combinatorics: The Breakfast of Mathletes**  
**ICTM 2010 Annual Meeting and Conference — Friday, October 15, 2010**  
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1. It's the school year. I have 5 somber pairs of slacks and 11 very plain shirts. How many outfits can I assemble of one pair of slacks and one shirt each?
2. Now it's summertime! I have 4 shirts, 2 hats, and 1 pair of sandals.
  - a. If I have no fashion sense (or no shame) and so think all of these match, how many outfits can I assemble of one shirt, one hat, and one pair of sandals each?
  - b. But hey, it's the summer! Who really cares how dressed I am? If I can go shirt-less, hat-less, or sandal-less (or all of those), now how many outfits are can I assemble?
3. How many positive integer factors does 720 have? (*Don't forget 1 and 720 itself!*)

If you can move along the lines of the grid at right:

4. How many moves is the shortest path from:
  - a. Start to A?
  - b. Start to B?
  - c. Start to C?
  - d. Start to D?
  - e. Start to End?
5. How many shortest-length paths are there from:
  - a. Start to A?
  - b. Start to B?
  - c. Start to C?
  - d. Start to D?
  - e. Start to End?



6. I was at a long professional development session yesterday, but I had promised my wife that I wouldn't have too many cookies. I set myself a rule that at the end of the first hour, I could have one cookie, at the end of the second hour, I could have two more, and so on.
  - a. How many cookies had I eaten in all at the end of the first, second, third, and fourth hours?
  - b. If the PD went for eight hours, how many cookies did I have in all?
  - c. If the PD went for one hundred hours, how many cookies did I have? (Is there a faster way?)
  - d. Is there a quick way to figure out the number of cookies for any number of hours?
  - e. What other questions could you ask either about, or inspired by, this situation?
7. Steven, Hylene, and Jenée all have hats that are identical outside, but have their names on the inside.
  - a. How many ways can they each take one cap?
  - b. In how many of those ways do all three of them get their own cap?
  - c. In how many of those ways do exactly two of them get their own cap?
  - d. In how many of those ways do exactly one of them get their own cap?
  - e. In how many of those ways do none of them get their own cap?