Tic-Tac-Toe and Variations

I. Regular Tic-Tac-Toe

1) Play some games of regular tic-tac-toe.

2) Can you write down some strategy suggestions for the game? What are things you do to win, or at least not lose?

3) Do you have a strategy that allows you to always win? To never lose? Does it matter whether you're the first or second player? Test your strategy against other players!

4) (For the ambitious.) Can you write down a complete program for playing tic-tac-toe? For example, if you're the first player, where do you move? Then how do you respond to the different possible first moves of your opponent? Etc.

II. Three Dimensional Tic-Tac-Toe

5) Try 3-D tic-tac-toe. Richard has a plastic board in his room, or you can use three regular tic-tac-toe boards, labeled top, middle and bottom. You can win on any level, or by getting three in a row vertically or diagonally.

6) Can 3-D tic-tac-toe end in a tie? Explain.

7) Do you have strategy tips for 3-D tic-tac-toe?

III. Achi from Ghana

8) In this game each player has four colored counters (for example, red for the first player, blue for the second; or dimes and pennies). They are placed on a tic-tac-toe board as in regular tic-tac-toe. If no one has won after all the counters have been played, the players continue by taking turns sliding one counter to the empty place next to it, moving vertically, horizontally or diagonally, still trying to get three in a row.

9) What's your strategy for this game? Is it better to play first or second? Can Achi end in a tie?

10) Achi is one member of a large family of games found all around the world. Another example, that is very ancient, is Nine Men's Morris. Find out how that is played and try it! Can you learn something about the history of Nine Men's Morris?

IV. The Number Game

11)   You can play this with nine bits of paper labeled 1 to 9. Players take turns taking one of the numbers. The first player who gets three numbers that add up to fifteen wins!

12)   What's your strategy for the number game?

13)   How is the number game related to tic-tac-toe?

V. And .....

14)   Make up your own variation! Teach it to some people and try it out! Explain your game in your POW write-up!

15)   Have fun!

I used these sources:

http://www.math.cornell.edu/~mec/2003-2004/graphtheory/tictactoe/howtoplayttt.html

http://www.math.cornell.edu/~mec/2003-2004/graphtheory/tictactoe/howtoplayttt.html#achi

http://en.wikipedia.org/wiki/Tic-tac-toe

PFS 22-2 Alternative   9/22/08

Regions in a Circle

1)   Chop up a circle by drawing chords. What's the maximum number of regions you can get for a given number of chords? For example, with three chords you can get seven regions.

2) Make a function chart to show your results.

3) Make some beautiful drawings to show your results.

4) What's the maximum number of regions you can get with ten chords?

5) Can you find a formula to solve this problem?

6) What's the maximum number of regions you can get with 100 chords?!

7) Have fun!