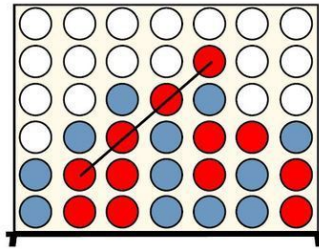# Mathletes Problem of the Week #10

Connect Four

This is a grid for the game Connect Four. In Connect Four, two players take turns to drop their counters into one of the seven columns. The winner is the first player to get four of their counters in a line, either vertically, horizontally, or diagonally. The image above shows one way for a player to win. Let's explore just how many ways are there to win in Connect Four.

a) Let's start with a smaller game board. Use the grid paper on the back to draw out a grid with 4 rows and 4 columns. How many ways are there to make a winning line of four in a row on this grid?

b) Draw a grid with 4 rows and 5 columns. How many ways are there to make a winning line of four in a row on this grid?

c) Try a grid with 4 rows and 6 columns, then one with 4 rows and 7 columns. How many winning lines are there in these grids? Is there a pattern here? Describe what you find.

d) Now, try some grids with 5 rows. How many winning lines are on each of them? Is there a similar pattern with these grids? Describe what you find.

e) Now back to our original question: how many winning lines are there on a standard Connect Four board with 6 rows and 7 columns. Show how you found your answer.

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Solutions & Explanations: (Try one or try them all! Record your solutions and explanations above and on the back. Attach more paper if you need to.)

Name _____   Class _____

(First and last name, please!)   **Solutions due: February 6th**