International Mathematical Talent Search – Round 6

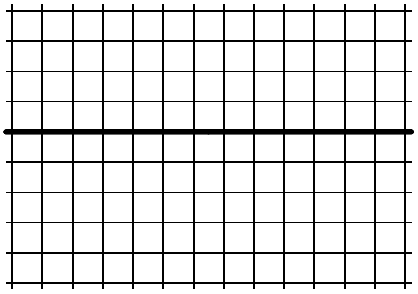
Problem 1/6. Nine lines, parallel to the base of a triangle, divide the other sides each into 10 equal segments and the area into 10 distinct parts. Find the area of the original triangle, if the area of the largest of these parts is 76.

Problem 2/6. In how many ways can 1992 be expressed as the sum of one or more consecutive integers?

Problem 3/6. Show that there exists an equiangular hexagon in the plane, whose sides measure 5, 8, 11, 14, 23, and 29 units in some order.

Problem 4/6. An international firm has 250 employees, each of whom speaks several languages. For each pair of employees, (A, B), there is a language spoken by A and not by B, and there is another language spoken by B and not by A. At least how many languages must be spoken at the firm?

Problem 5/6. An infinite checkerboard is divided by a horizontal line into upper and lower halves as shown on the right. A number of checkers are to be placed on the board below the line (within the squares). A "move" consists of one checker jumping horizontally or vertically over a second checker, and removing the second checker.



What is the minimum value of n which will allow the placement of the last checker in row 4 above the dividing horizontal line after $n-1$ moves? Describe the initial position of the checkers as well as each of the moves.