

Turkey Junior National Olympiad 2009

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- 1 Let the tangent line passing through a point A outside the circle with center O touches the circle at B and C . Let $[BD]$ be the diameter of the circle. Let the lines CD and AB meet at E . If the lines AD and OE meet at F , find $|AF|/|FD|$.

- 2 In the beginning, each square of a strip formed by n adjacent squares contains 0 or 1. At each step, we are writing 1 to the squares containing 0 and to the squares having exactly one neighbour containing 1, and we are writing 0s into the other squares.

Determine all possible values of n such that whatever the initial arrangement of 0 and 1 is, after finite number of steps, all squares can turn into 0.

- 3 The integer n has exactly six positive divisors, and they are: $1 < a < b < c < d < n$. Let $k = a - 1$. If the k -th divisor (according to above ordering) of n is equal to $(1 + a + b)b$, find the highest possible value of n .