

MAΘ Competition Team Problem Set 7

Anders Christensen, Minjoo Kim

January 9, 2026

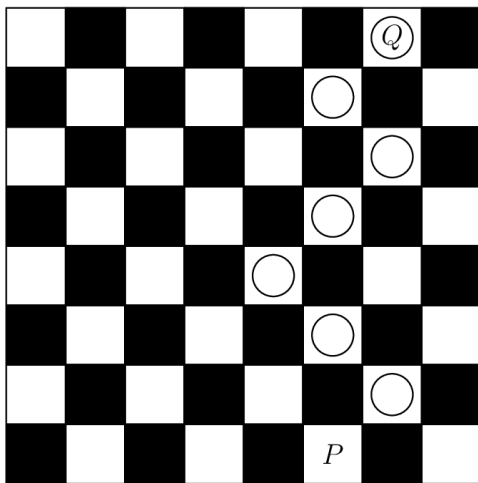
Problem 1. Find all entries in the eighth row of Pascal's Triangle.

Problem 2. Explain why $\binom{n}{k} = \binom{n}{n-k}$ using Pascal's Triangle.

Problem 3. Using Pascal's Triangle, find the coefficient of x^6y^3 in the expansion of $(x+y)^9$.

Problem 4. Prove that if p is a prime number, every interior entry in row p is divisible by p .

Problem 5. A game board consists of 64 squares that alternate in color between black and white. The figure below shows square P in the bottom row and square Q in the top row. A marker is placed at P . A step consists of moving the marker onto one of the adjoining white squares in the row above. How many 7-step paths are there from P to Q ? (The figure shows a sample path.)



Problem 6. What is the number of terms with rational coefficients among the 1001 terms in the expansion of $(x\sqrt[3]{2} + y\sqrt{3})^{1000}$?

Problem 7 (Challenge). How many odd numbers are there in the 2026th row of Pascal's Triangle? (Hint: Look up Kummer's Theorem)