

Belgium Flanders Mathematical Olympiad 2003

- 1 Playing soccer with 3 goes as follows: one player is a goalkeeper; the other two try to make a goal, the one who makes the goal stands goalman for next game, etc. Arne, Bart and Cauchy played this game. Later, they told their math teacher that A stood 12 times on the field, B 21 times on the field, C 8 times in the goal. Their teacher knows who made the 6th goal. Who made it?
- 2 Two circles C_1 and C_2 intersect at S . The tangent from S to C_1 intersects C_2 in A different from S . The tangent from S to C_2 intersects C_1 in B different from S . Another circle C_3 passes through A, B, S . The tangent in S to C_3 intersects C_1 in P different from S and C_2 in Q different from S . Prove that $PS = QS$.
- 3 A number consists of 3 different digits. The sum of the 5 other numbers formed with those digits is 2003. Find the number.
- 4 Prove that for all $n \in \mathbb{N}$, there exists r such that the circle centered at the origin and radius r passes through at least n points whose both coordinates are integers.