

Flanders Math Olympiad 2003

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by Peter

– 11-12

- 1** Playing soccer with 3 goes as follows: 2 field players try to make a goal past the goalkeeper, the one who makes the goal stands goalman for next game, etc.

Arne, Bart and Cauchy played this game. Later, they tell 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 in S to C_1 intersects C_2 in A different from S .
The tangent in S to C_2 intersects C_1 in B different from S .
Another circle C_3 goes 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 the distance PS is equal to the distance QS .
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- 3** A number consists of 3 different digits. The sum of the 5 other numbers formed with those digits is 2003. Find the number.
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- 4** Consider all points with integer coordinates in the cartesian plane. If one draws a circle with $M(0,0)$ and a well-chosen radius r , the circle goes through some of those points. (like circle with $r = 2\sqrt{2}$ goes through 4 points)

Prove that $\forall n \in \mathbb{N}, \exists r$ so that the circle with midpoint $0,0$ and radius r goes through at least n points.

– 9-10
