MathLovers

Problems – 08/28/2025

The solutions to the problems below
will be published on Sunday 08/31/2025

Problem 1. Given is a circle o_1 with center O and its diameter MN. Point P lies on this circle, and the line NP intersects at point Q the line k perpendicular to the diameter MN passing through the center of the circle. Point P' is the reflection of point P with respect to line k, and point Q' is the intersection of line NP' with line k. Knowing that the radius of circle o_1 has length r, determine the product $OQ' \cdot OQ$ in terms of the radius length.

Problem 2. Given a positive integer n. Prove that there exists a circle in the coordinate plane that contains exactly n lattice points (that is, points with both coordinates integers) in its interior.

Good Luck!

We encourage you to submit your solutions via the website:
https://mathlovers.eu/submit-solution/!