www.artofproblemsolving.com/community/c3236486
by parmenides51

1   The quadrilateral $ABCD$ is a square of sidelength 1, and the points E, F, G, H are the midpoints of the sides. Determine the area of quadrilateral $PQRS$.
https://1.bp.blogspot.com/--fMGH2lX6Go/XzcDqhgGKfI/AAAAAAAAMXo/x4NATcMDJ2MeUe-O0xBGKZ_
B4l_QzROjACLcBGAsYHQ/s0/2000%2BMohr%2Bp1.png

2   Three identical spheres fit into a glass with rectangular sides and bottom and top in the form of regular hexagons such that every sphere touches every side of the glass. The glass has volume 108 cm^3. What is the sidelength of the bottom?
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s0/2000%2BMohr%2Bp2.png

3   A *Georg Mohr* cube is a cube with six faces printed respectively G, E, O, R, M and H. Peter has nine identical Georg Mohr dice. Is it possible to stack them on top of each other for a tower there on each of the four pages in some order show the letters $G\ E\ O\ R\ G\ M\ O\ H\ R$?

4   A rectangular floor is covered by a certain number of equally large quadratic tiles. The tiles along the edge are red, and the rest are white. There are equally many red and white tiles. How many tiles can there be?

5   Determine all possible values of $x + \frac{1}{x}$, where the real number x satisfies the equation

$$x^4 + 5x^3 - 4x^2 + 5x + 1 = 0$$

and solve this equation.