

Geometry

Senior League

1. Find the angles of a triangle ABC , knowing that its altitude CD and bisector BE meet at a point M such that $CM = 2MD$ and $BM = ME$. *(A. A. Egorov)*
2. Is it possible to construct a 27-gon that has an inscribed circle and side lengths $1, 2, \dots, 27$? You can arrange its sides in any desired order. *(I. A. Sheipak)*
3. Eight wooden balls are placed in a cubic box measuring $1 \times 1 \times 1$. Can the sum of their radii be greater than 2? *(V. N. Dubrovsky, K. A. Knop)*
4. Let $KMLN$ be a square and let CML be a right triangle constructed externally on the side ML as hypotenuse. The sides CM and CL are extended to meet the line KN at A and B , respectively. Denote by P the intersection point of segments AL and KM , and by Q , the intersection point of BM and NL . Prove that CPQ is an isosceles triangle. *(Stan Fulger)*