

CONFIGURATIONS

Problem 1. Show that there are 9 lines and 9 points in the plane such that each given line contains exactly 3 given points, and each given point lies on exactly 3 given lines.

Problem 2. Consider four points in the space that do not lie on the same plane. A plane P is said to be *equidistant* from the four points if P is of the same distance from each of the points. How many equidistant planes are there?

Problem 3. Consider four planes in the space. What is the maximal number of spheres tangent to all four planes?

Problem 4. In how many ways one can label all faces of the cube? Two labelings are considered the same if they only differ by a rotation of the cube.

Problem 5. Several circles divide the plane into several regions. Prove that one can color all regions black and white in such a way that any two adjacent regions (i.e. whose boundaries intersect by an arc) are colored differently.

Problem 6. What is the maximal number of regions (connected components), into which n lines can divide the plane?

Problem 7. The same problem for circles.

Problem 8. Suppose that no three diagonals of a convex n -gon pass through the same point. How many intersection points of two diagonals are there?