

**Year 4 Session 90 (2008-2009 school year)**

**Mathematical Battle.**

1. Fifty kids are placed around a circular table. Number of boys and girls are equal. Prove that there exists a child sitting between two girls.
2. Sasha cooked some homemade noodles. Each noodle had a different weight: 1 gr., 2 gr., 3 gr., ... 2001 gr. He wants to place these noodles (not necessary all of them) into a few plates in such a way that each plate contains equal amount of noodles (weight wise). What is the maximal possible number of plates?
3. At a summer math cap, group of kids (at least 10) are standing inside an equilateral triangle with the side 30. Out of these kids, 10 are given an extra problem to solve during a lunch break, so these kids are not too happy. Prove that it is possible to find two unhappy kids that are standing not more than 10 meters apart.
4. At a summer math camp, a teacher assigned numbers to all kids in his class. Then he told them to line up in a single row. He also added that those kids whose numbers will be equal to arithmetic means of numbers of some right neighbor and some left neighbor (not necessary immediate), will receive an extra problem for lunch. Prove that kids can trick a teacher – line up in such a way that nobody would get an extra problem.
5. At a summer math camp, it is necessary to form a team to do some kitchen chores. They need 3 boys and two girls into this team, Girls should be from a same room. A day before, after light out time, the teachers have found a few kids in a room occupied by three girls. The girls had 8 visitors: 3 girls from a room next door, and 5 boys from somewhere. In how many ways a kitchen team can be formed?
6. A teacher had placed 12 kids who misbehaved in a circle, and is assigning extra problems to them. He assigns each problem to a group of 4 kids standing one by another. After he has assigned a few problems, it turned out that students have the following amounts of extra problems to solve: 2,6,7,7,8,9,8,10,9,4,4,6. These numbers correspond to the students positions in the circle. Prove that some of these kids have already received some extra problem from another teacher as well.