

MATHEMATICAL AUCTION!

1. Using the digits 1, 9, 8, and 4 in the given order and 4 arithmetic operations, write as many consecutive natural numbers as you can, starting with 1.
2. Find as many *unique* ways to place 8 queens on a chessboard so that no two attack each other. Two ways of doing this are considered the *same* if you can get from one solution to another using rotations and reflections.
3. Produce as many integers as you can (not necessarily consecutive) such that, given any two, the difference of their squares is not divisible by 100.
4. Divide the digits 1, 2, ..., 9 into n groups such that, in each group, the product of all the elements in that group does not exceed 71. The goal is to make n as small as possible.
5. Given any collection of n people we can ask, "Is it the case that either 3 of them are friends, or 3 of them are strangers?". Find the least number n so that this answer is "yes" *for any collection of n people*.
6. You have two identical pumpkins, and you're near a 100-story building. You are allowed to drop a pumpkin from any story, until it breaks. You want to determine, with the least number of drops, the first story at which the pumpkin will break.
7. Find the maximum number of points you can place inside a square of 1 meter such that no set of three points can be contained inside a square of 20 centimeters.