

# Lectures on Challenging Mathematics

## Math Challenges 1

### Counting

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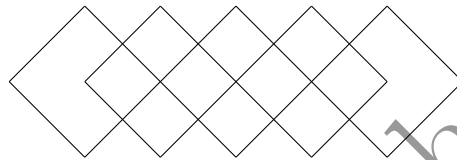
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Internal Use

## 1.8 Basic counting practices (part 8)

1. Brian wants to sell 50 identical pencils in groups of 2 or 3. In how many ways can the pencils be grouped?
2. How many rectangles of any size are in the diagram shown below?



3. When writing the positive integers from 1 to 1000 how many times is the digit 6 written?
4. Aunt Mary and uncle Sam are celebrating labor day weekend with Andrew, Brad, and Cindy. Aunt Mary made six *indistinguishable* cupcakes to give to Andrew, Brad, and Cindy. In how many ways can she distribute these cupcakes among the kids so that each of them gets at least one cupcake?  
(The term *indistinguishable* refers to the fact that the cupcakes are so identical that there is no way to tell them apart.)
5. (Continuation) Uncle Sam has six *distinguishable* balloons.
  - (a) If each child gets exactly one balloon (and uncle Sam keeps the remaining three), in how many different ways can this be done?
  - (b) If each child gets exactly two balloons, in how many different ways can this be done?