
Coins in my pocket

by Gil French

1. Suppose you have 35 coins and 9 pockets. Is it possible to put a different number of coins in each pocket? (Having 0 coins in a pocket is allowed.)
2. In each case below, find the minimum number of coins you can have, if you have a different number of coins in each pocket.
 - (a) You have 3 pockets.
 - (b) You have 4 pockets.
 - (c) You have 5 pockets.
3. Suppose you have n pockets. What's the minimum number of coins you can have, if you have a different number of coins in each pocket?

Solutions

1. It's not possible. If you assume the least number in the first pocket—0 coins—the next least (1 coin) in the second pocket, and so on, you get 36 coins for 9 pockets. For 35 coins, you could have 8 pockets with 0, 1, 2, ..., 7, but the ninth pocket could only have 7 coins.
2. Using the same kind of reasoning:
 - (a) at least 3 coins (0+1+2)
 - (b) at least 6 coins (0+1+2+3)
 - (c) at least 10 coins (0+1+2+3+4)
3. The number of different coins is the sum of the first $n - 1$ counting numbers. (Since 0 doesn't contribute to the sum, there are only $n - 1$ numbers you have to add together.) This is also $\frac{(n-1)n}{2}$.