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Regulars

A Reader's Solution



Here is Rafik Ouared's solution to [puzzle number 6](#).

The answer to the question is : 81 medallions on average (rounded number).

Explanation: the equivalent problem is to fill 22 empty boxes sequentially. Each time one fills one box, he moves to fill the next one by drawing in average a number of medallions before finding the one different from the ones in the boxes behind.

Let N be the number of boxes to fill ($N=22$).

Let n be the position of the n th box to fill after the $n-1$ before filled.

Let M_n be the average of medallions one needs to fill the n th box with the right medallion.

Let P_n the probability to find the right medaillon for the n th box.

Then:

$$P_n = 1/(M_n) = (N-n+1)/N$$

So, for the n th box, the average number of medallions one needs is:

$$M_n = N/(N-n+1)$$

And to get $N=22$ different pictures one needs in average to buy :

$$M = M_1 + M_2 + \dots + M_{22} = 22*(1/22 + 1/21 + 1/20 + \dots + 1/2 + 1)$$

Result:

$$M = 81.1978 \text{ rounded to } 81.$$

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Plus is part of the family of activities in the Millennium Mathematics Project, which also includes the NRICH and MOTIVATE sites.