MATHS

Four different object $1, 2, 3, 4$ are distributed at random in four places marked $1, 2, 3, 4$. What is the probability that none of the objects occupy the place corresponding to its number?

A $\frac{17}{24}$

B $\frac{3}{8}$

C $\frac{1}{2}$

D $\frac{5}{8}$

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ANSWER

There are three different cases:
(1) Three correspond
(2) Two correspond
(3) One corresponds
(1) There is only 1 way for three objects to match. If $1, 2, 3$ match, then 4 must

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be in its position too. Thus, all of them will be in their corresponding position.
(2) There are ${}^4\mathrm{C}_2 = 6$ ways for two to match. For each number pair, there is

exactly one way for the other two numbers not to match their position. For example, if 1 and 2 match their position, then 3 and 4 must be in wrong positions. I can choose 6 different pairs out of 4 numbers.
(3) There are $4 \times 2 = 8$ ways for only one number to match its position. For example, there are only two ways for number 1 to be on its position while the other three are not: $1, 3, 4, 2$ and $1, 4, 2, 3$.
Hence, there are overall $1 + 6 + 8 = 15$ different ways that at least one object corresponds to its number and $4 = 24$ ways to organize four objects.
The probability that no number occupies the place corresponding to it's number is therefore
$\therefore 1 - \frac{15}{24} = \frac{9}{24} = \frac{3}{8}$

Answered By toppr

How satisfied are you with the answer?

This will help us to improve better

random using the digits 1 to 9 without repetition, then the probability that the number thus formed is divisible by 3 is

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View Answer

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Five cards are drawn successively with replacement from a well-shuffled deck of 52 cards. What is the probability that
(i) all the five cards are spades ?
(ii) only 3 cards are spades ?
(iii) none is a spade ?

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If a 7 digit number is formed at