

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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EXAMPLE DEFINITIONS FORMULAE

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

be in its position too. Thus, all of them will be in their corresponding position.

(2) There are ${}^4C_2 = 6$ 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 its 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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143 Qs

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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 ?

Study later 

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If a 7 digit number is formed at