T14 G1 04 Mar 2022

04 March 2022 11:07

Pigeonhole principle :→

If n pigeonholes are occupied by n+1 or more pigeons, then at least one pigeonhole is occupied by more than one pigeon.

6 pigeons

Eg There are 13 students in a class then at least two student were born on the same month.

Generalized pigeonhole principle :→

n+1

If n pigeonholes are occupied by Kn+1 or more pigeons, where K is a +ve integer, then at least one pigeonhole is occupied by (K+1) or more pigeons.

K=1

n pigeonholes

n+1 or more

2 or more.

K=2

2n+1 pigeons

n=3

Kn+1 = 7 pigeons

Find the minimum no. of students in a class to be sure that there r them are born in the same month.

n = 12

K+1 = 3

K = 2

Kn+1 =

↓

2(12)+1

= 25

Suppose a bag contains many red, white and blue socks. Find the minimum no. of socks that one needs to choose in order to get two pairs (4 socks) of the same color.

$n = 3$ (color) Pigeonhole)

$K+1 = 4 \Rightarrow K = 3$

$Kn+1 = 3(3)+1$

$= 10$

Find the minimum no. of students needed to guarantee that five of them belongs to the same class (BCA I, BCA II, MCA I, MCA II)

$n = 4$

$K+1 = 5 \Rightarrow K = 4$

$Kn+1 = 4(4)+1 = 17$

Example 84: *What shall be the minimum number of words that must begin with the same alphabet at 27 English words.*

26 Alphabet

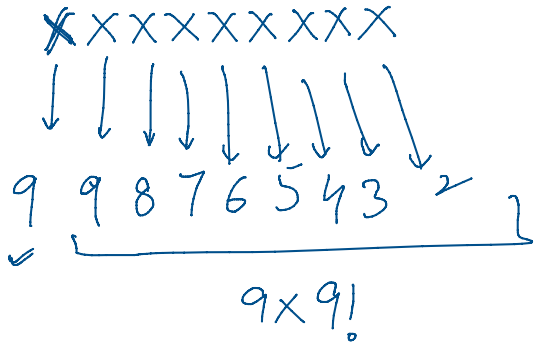
a b c d e f ---------- 26^{th} ↓ Z ↓ ?

$Kn+1 = 27$, $n = 26$

$K+1 = ?$

The total number of 9 digit numbers which have all different digits is

(a) $10!$ (b) $9 \times 9!$ (c) $9!$ (d) $10 \times 10!$


XXXXXXXXX
9 9 8 7 6 5 4 3 2
9×9!