C12 - 11.4 - ABC nPr, n!; nCr Notes

Arranging All the Letters of ABC

27

No restrictions (repeats allowed)

$$\underset{\text{Eg.(A, B or C)}}{3} \times \underset{\text{Eg.(A, B or C)}}{3} \times \underset{\text{Eg. (A, B or C)}}{3} = 3^3 = 27$$

AAA	AAB	ABA	BAA	ABC
BBB	AAC	ACA	CAA	ACB
CCC	BBA	BAB	ABB	BAC
	BBC	BCB	CBB	BCA
	CCA	CAC	ACC	CAB
	CCB	CBC	BCC	CBA

No repeats

Permutation *Particular Order matters*

$ABC \quad ACB \quad BAC \quad BCA \quad CBA \quad CAB$

6

$$\underset{\text{Eg.(A or B or C)}}{3} \times \underset{\text{Eg.(A or C)}}{2} \times \underset{\text{Eg. (C)}}{1} = 3! = 6$$

$${}_nP_r = \frac{n!}{(n-r)!}$$

$${}_3P_3 = \frac{3!}{(3-3)!} = \frac{3!}{0!} = \frac{3!}{1} = 3! = 6$$

No repeats

Combination *Order doesn't matter*

$ABC = ACB = BAC = BCA = CBA = CAB$

1

$${}_nC_r = \frac{n!}{r!\,(n-r)!}$$

$${}_3C_3 = \frac{3!}{3!\,(3-3)!} = \frac{3!}{3! \times 0!} = \frac{3!}{3!} = \frac{3 \times 2 \times 1}{3 \times 2 \times 1} = 1$$

C12 - 11.4 - ABC ## nPr, n!, nCr Notes

Arranging Two of the Letters of ABC

No restrictions (repeats allowed)

$$\underset{\text{(A, B or C)}}{3} \times \underset{\text{(A, B or C)}}{3} = 9$$

AA AB AC CB
BB BA CA BC } 9
CC

No repeats

Permutation *Particular Order matters*

AA AB AC CB
BB BA CA BC } 6
CC

$$\underset{\text{(A or B or C)}}{3} \times \underset{\text{(B or C)}}{2} = 6$$

$${}_nP_r = \frac{n!}{(n-r)!}$$

$${}_3P_2 = \frac{3!}{(3-2)!} = \frac{3!}{1!} = \frac{3!}{1} = 3! = 3 \times 2 \times 1 = 6$$

No repeats

Combination *Order doesn't matter*

$AB = BA$ $AC = CA$ $BC = CB$ } 3

$${}_nC_r = \frac{n!}{r!\,(n-r)!}$$

$${}_3C_2 = \frac{3!}{2!\,(3-2)!} = \frac{3!}{2! \times 1!} = \frac{3!}{2!} = \frac{3 \times 2 \times 1}{2 \times 1} = \frac{6}{2} = 3$$

C12 - 11.4 - 1,2,3 nPr, n! Notes

How many 3 digit numbers can we make from the numbers 1,2,3 with no repeats?

Permutation

Order matters

6 { 123, 132, 231, 213, 312, 321

$$\underset{\text{Eg.(1 or 2 or 3)}}{3} \times \underset{\text{Eg.(1 or 3)}}{2} \times \underset{\text{Eg. (3)}}{1} = 3! = 6$$

$$_nP_r = \frac{n!}{(n-r)!}$$

Permutation: $_3P_3 = \frac{3!}{(3-3)!} = \frac{3!}{0!} = \frac{3!}{1} = 3! = 3 \times 2 \times 1 = 6$

How many 2 digit numbers can we make from the numbers 1,2,3 with no repeats?

Permutation

Order matters

6 { 12, 21, 13, 31, 23, 32

$$\underset{\text{Eg.(1 or 2 or 3)}}{3} \times \underset{\text{Eg.(1 or 3)}}{2} = 6$$

$$_nP_r = \frac{n!}{(n-r)!}$$

Permutation: $_3P_2 = \frac{3!}{(3-2)!} = \frac{3!}{1!} = \frac{3!}{1} = 3! = 3 \times 2 \times 1 = 6$

How many 3 digit numbers can we make from the numbers 1,2,3 with no restrictions?

27 {

111	112	221	331	123
222	113	223	332	132
333	121	212	313	231
	131	232	323	213
	122	211	311	321
	133	233	322	312

$$\underset{\text{Eg.(1 or 2 or 3)}}{3} \times \underset{\text{Eg.(1 or 2 or 3)}}{3} \times \underset{\text{Eg.(1 or 2 or 3)}}{3} = 3^3 = 27$$