

Ques. The total number of ways in which 5 balls of different colours can be distributed among 3 persons so that each person gets at least one ball? (2012)

Sol. Each person gets at least one ball
3 persons can have 5 balls in the following systems

Persons	I	II	III
no. of balls	1	1	3

or

Persons	I	II	III
no. of balls	1	2	2

The number of ways to distribute the balls in ~~system~~ first system

$$= {}^5C_1 \times {}^4C_1 \times {}^3C_3$$

As 3 persons having 1, 1, 3 balls can be arranged in $\frac{3!}{2!}$ ways.

no. of ways to distribute 1, 1, 3 balls to the three persons

$$= {}^5C_1 \times {}^4C_1 \times {}^3C_3 \times \frac{3!}{2!} = 60$$

Similarly for 1, 2, 2 balls

$$= {}^5C_1 \times {}^4C_2 \times {}^2C_2 \times \frac{3!}{2!} = 90$$

Required no. of ways = 60 + 90 = 150