Permutations Ex 16.3 Q9

We have,

$$P(n-1,3) : \quad P(n,4) = 1 : 9$$

$$\Rightarrow \quad \frac{P(n-1,3)}{P(n,4)} = \frac{1}{9}$$

$$\Rightarrow \quad \frac{(n-1)!}{\frac{(n-1-3)!}{\frac{n!}{(n-4)!}}} = \frac{1}{9}$$

$$\Rightarrow \quad \frac{(n-1)! \times (n-4)!}{(n-4)! \times n!} = \frac{1}{9}$$

$$\Rightarrow \quad \frac{(n-1)}{n!} = \frac{1}{9}$$

$$\Rightarrow \quad \frac{(n-1)!}{n \times (n-1)!} = \frac{1}{9}$$

$$\Rightarrow \quad \frac{1}{n} = \frac{1}{9}$$

$$\Rightarrow \quad n = 9$$

Hence, $n = 9$

Permutations Ex 16.3 Q10

We have,

$$P(2n-1,n):\quad P(2n+1,n-1)=22:7$$

$$\Rightarrow \quad \frac{P(2n-1,n)}{P(2n+1,n-1)}=\frac{22}{7}$$

$$\Rightarrow \quad \frac{\frac{(2n-1)!}{(2n-1-n)!}}{\frac{(2n+1)!}{[2n+1-(n-1)]!}}=\frac{22}{7}$$

$$\Rightarrow \quad \frac{(2n-1)!\times(n+2)!}{(n-1)!(2n+1)!}=\frac{22}{7}$$

$$\Rightarrow \quad \frac{(2n-1)!\times(n+2)(n+2-1)(n+2-2)(n+2-3)!}{(n-1)!(2n+1)(2n+1-1)(2n+1-2)!}=\frac{22}{7}$$

$$\Rightarrow \quad \frac{(2n-1)!\times(n+2)(n+1).n.(n-1)!}{(n-1)!(2n+1).2n.(2n-1)!}=\frac{22}{7}$$

$$\Rightarrow \quad \frac{n(n+2)(n+1)}{2n(2n+1)}=\frac{22}{7}$$

$$\Rightarrow \quad \frac{(n+2)(n+1)}{2(2n+1)}=\frac{22}{7}$$

$$\Rightarrow \quad \frac{n^2+n+2n+2}{4n+2}=\frac{22}{7}$$

$$\Rightarrow \quad 7(n^2+3n+2)=22\times(4n+2)$$

$$\Rightarrow \quad 7n^2+21n+14=88n+44$$

$$\Rightarrow \quad 7n^2+21n-88n+14-44=0$$

$$\Rightarrow \quad 7n^2-67n-30=0$$

$$\Rightarrow \quad 7n^2-70n+3n-30=0$$

$$\Rightarrow \quad 7n(n-10)+3(n-10)=0$$

$$\Rightarrow \quad (n-10)(7n+3)=0$$

$$\Rightarrow \quad n-10=0 \qquad [\because\ 7n+3\neq 0]$$

$$\Rightarrow \quad n=10$$

Permutations Ex 16.3 Q11

We have,

$$P(n,5) : \quad P(n,3) = 2 : 1$$

$$\Rightarrow \quad \frac{P(n,5)}{P(n,3)} = \frac{2}{1}$$

$$\Rightarrow \quad \frac{\frac{n!}{(n-5)!}}{\frac{n!}{(n-3)!}} = \frac{2}{1}$$

$$\Rightarrow \quad \frac{n! \times (n-3)!}{(n-5)! \times n!} = 2$$

$$\Rightarrow \quad \frac{(n-3)!}{(n-5)!} = 2$$

$$\Rightarrow \quad \frac{(n-3)(n-4)(n-5)!}{(n-5)!} = 2$$

$$\Rightarrow \quad (n-3)(n-4) = 2$$

$$\Rightarrow \quad n^2 - 4n - 3n + 12 = 2$$

$$\Rightarrow \quad n^2 - 7n + 12 - 2 = 0$$

$$\Rightarrow \quad n^2 - 7n + 10 = 0$$

$$\Rightarrow \quad n^2 - 5n - 2n + 10 = 0$$

$$\Rightarrow \quad n(n-5) - 2(n-5) = 0$$

$$\Rightarrow \quad (n-5)(n-2) = 0$$

$$\Rightarrow \quad n = 5 \qquad \begin{bmatrix} \because n \geq 5 \\ \therefore n \neq 2 \end{bmatrix}$$

Hence, $n = 5$

********** END **********