Permutations Ex 16.1 Q10

We have,

$$\frac{\frac{(2n)!}{3!(2n-3)!}}{\frac{n!}{2!(n-2)!}} = \frac{44}{3}$$

$$\Rightarrow \quad \frac{(2n)! \times 2!(n-2)!}{3!(2n-3)! \times n!} = \frac{44}{3}$$

$$\Rightarrow \quad \frac{(2n)(2n-1)(2n-2)(2n-3)! \times 2!(n-2)!}{3 \times 2!(2n-3)! \times n(n-1)(n-2)!} = \frac{44}{3}$$

$$\Rightarrow \quad \frac{2n(2n-1)(2n-2)}{3n(n-1)} = \frac{44}{3}$$

$$\Rightarrow \quad \frac{2(2n-1) \times 2(n-1)}{3(n-1)} = \frac{44}{3}$$

$$\Rightarrow \quad 4(2n-1) = 44$$

$$\Rightarrow \quad 2n - 1 = 11$$

$$\Rightarrow \quad 2n = 12$$

$$\Rightarrow \quad n = 6$$

$$\therefore \quad n = 6$$

Permutations Ex 16.1 Q11(i)

We have,

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

$$= \frac{n(n-1)(n-2)(n-3)\ldots(n-r+2)(n-r+1)(n-r)!}{(n-r)!}$$

$$= n(n-1)(n-2)(n-3)\ldots(n-r+2)(n-r+1)$$

$$= n(n-1)(n-2)(n-3)\ldots\left((n-(r-2))(n-(r-1)\right)$$

$$= n(n-1)(n-2)(n-3)\ldots(n-(r-1))$$

$= \text{RHS}$

$\therefore$ LHS = RHS

Hence proved

Permutations Ex 16.1 Q11(ii)

We have,

$$\text{LHS} = \frac{n!}{(n-r)!\,r!} + \frac{n!}{(n-r+1)!\,(r-1)!}$$

$$= \frac{n!}{(n-r)!\,r \times [(r-1)!]} + \frac{n!}{(n-r+1)[(n-r)!](r-1)!}$$

$$= \frac{n!}{(n-r)! \times (r-1)!}\left[\frac{1}{r} + \frac{1}{n-r+1}\right]$$

$$= \frac{n!}{(n-r)! \times (r-1)!}\left[\frac{n-r+1+r}{r(n-r+1)}\right]$$

$$= \frac{n!}{(n-r)! \times (r-1)!}\left[\frac{n+1}{r(n-r+1)}\right]$$

$$= \frac{(n+1) \times n!}{(n-r+1) \times (n-r)! \times r \times (r-1)!}$$

$$= \frac{(n+1)!}{(n-r+1)! \times r!}$$

$$= \frac{(n+1)!}{r!\,(n-r+1)!}$$

$= \text{RHS}$

$\therefore$ LHS = RHS

Hence proved

Permutations Ex 16.1 Q12

We have,

$$\text{LHS} = \frac{(2n+1)!}{n!}$$

$$= \frac{(2n+1)[1.2.3.4.5.6.7.8...(2n-1)2n]}{n!}$$

$$= \frac{[1.3.5.7......(2n-1)\times(2n+1)][2.4.6.8...(2n-2)2n]}{n!}$$

$$= \frac{[1.3.5.7......(2n-1)(2n+1)]\times 2^n\,[1.2.3.4.....(n-1)n]}{n!}$$

$$= \frac{[1.3.5.7......(2n-1)(2n+1)]2^n \times n!}{n!}$$

$$= 2^n\,[1.3.5.7....(2n-1)(2n+1)]$$

= RHS

Hence proved

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