



Permutations Ex 16.1 Q10

We have,

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

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

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

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

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

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

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

$$\Rightarrow 2n = 12$$

$$\Rightarrow n = 6$$

$$\therefore n = 6$$

Permutations Ex 16.1 Q11(i)

We have,

$$\begin{aligned}
 \text{LHS} &= \frac{n!}{(n-r)!} \\
 &= \frac{n(n-1)(n-2)(n-3)\dots(n-r+2)(n-r+1)(n-r)!}{(n-r)!} \\
 &= n(n-1)(n-2)(n-3)\dots(n-r+2)(n-r+1) \\
 &= n(n-1)(n-2)(n-3)\dots((n-(r-2))(n-(r-1))) \\
 &= n(n-1)(n-2)(n-3)\dots(n-(r-1)) \\
 &= \text{RHS}
 \end{aligned}$$

\therefore LHS = RHS

Hence proved

Permutations Ex 16.1 Q11(ii)

We have,

$$\begin{aligned}
 \text{LHS} &= \frac{n!}{(n-r)!r!} + \frac{n!}{(n-r+1)!(r-1)!} \\
 &= \frac{n!}{(n-r)!r \times [(r-1)!]} + \frac{n!}{(n-r+1)[(n-r)!](r-1)!} \\
 &= \frac{n!}{(n-r)! \times (r-1)!} \left[\frac{1}{r} + \frac{1}{n-r+1} \right] \\
 &= \frac{n!}{(n-r)! \times (r-1)!} \left[\frac{n-r+1+r}{r(n-r+1)} \right] \\
 &= \frac{n!}{(n-r)! \times (r-1)!} \left[\frac{n+1}{r(n-r+1)} \right] \\
 &= \frac{(n+1) \times n!}{(n-r+1) \times (n-r)! \times r \times (r-1)!} \\
 &= \frac{(n+1)!}{(n-r+1)! \times r!} \\
 &= \frac{(n+1)!}{r!(n-r+1)!} \\
 &= \text{RHS}
 \end{aligned}$$

\therefore LHS = RHS

Hence proved

Permutations Ex 16.1 Q12

We have,

$$\begin{aligned}\text{LHS} &= \frac{(2n+1)!}{n!} \\&= \frac{(2n+1)[1.2.3.4.5.6.7.8\dots(2n-1)2n]}{n!} \\&= \frac{[1.3.5.7\dots(2n-1) \times (2n+1)][2.4.6.8\dots(2n-2)2n]}{n!} \\&= \frac{[1.3.5.7\dots(2n-1)(2n+1)] \times 2^n [1.2.3.4\dots(n-1)n]}{n!} \\&= \frac{[1.3.5.7\dots(2n-1)(2n+1)] 2^n \times n!}{n!} \\&= 2^n [1.3.5.7\dots(2n-1)(2n+1)] \\&= \text{RHS} \\&\text{Hence proved}\end{aligned}$$

***** END *****