



Permutations Ex 16.3 Q6

We have,

$$P(9, r) = 3024$$

$$\Rightarrow \frac{9!}{(9-r)!} = 3024 \quad \left[ \because {}^n P_r = \frac{n!}{(n-r)!} \right]$$

$$\Rightarrow \frac{1}{(9-r)!} = \frac{3024}{9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}$$

$$\Rightarrow \frac{1}{(9-r)!} = \frac{336}{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}$$

$$\Rightarrow \frac{1}{(9-r)!} = \frac{42}{7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}$$

$$\Rightarrow \frac{1}{(9-r)!} = \frac{1}{5 \times 4 \times 3 \times 2 \times 1}$$

$$\Rightarrow \frac{1}{(9-r)!} = \frac{1}{5!}$$

$$\Rightarrow (9-r)! = 5!$$

$$\Rightarrow 9-r = 5$$

$$\Rightarrow 9-5 = r$$

$$\Rightarrow 4 = r$$

$$\Rightarrow r = 4$$

Hence,  $r = 4$

Permutations Ex 16.3 Q7

We have,

$$P(11, r) = P(12, r - 1)$$

$$\Rightarrow \frac{11!}{(11-r)!} = \frac{12!}{[12-(r-1)]!} \quad \left[ \because {}^n P_r = \frac{n!}{(n-r)!} \right]$$

$$\Rightarrow \frac{11!}{(11-r)!} = \frac{12 \times 11!}{[12-r+1]!}$$

$$\Rightarrow \frac{1}{(11-r)!} = \frac{12}{[13-r]!}$$

$$\Rightarrow \frac{1}{(11-r)!} = \frac{12}{(13-r)(13-r-1)(13-r-2)!}$$

$$\Rightarrow \frac{1}{(11-r)!} = \frac{12}{(13-r)(12-r)(11-r)!}$$

$$\Rightarrow \frac{(13-r)(12-r)(11-r)}{(11-r)!} = 12$$

$$\Rightarrow (13-r)(12-r) = 12$$

$$\Rightarrow 156 - 13r - 12r + r^2 = 12$$

$$\Rightarrow r^2 - 25r + 156 - 12 = 0$$

$$\Rightarrow r^2 - 25r + 144 = 0$$

$$\Rightarrow r^2 - 16r - 9r + 144 = 0$$

$$\Rightarrow r(r-16) - 9(r-16) = 0$$

$$\Rightarrow (r-16)(r-9) = 0$$

$$\Rightarrow r - 9 = 0 \quad \left[ \begin{array}{l} \because r \leq 11 \\ \therefore r \neq 16 \end{array} \right]$$

$$\Rightarrow r = 9$$

Permutations Ex 16.3 Q8

We have,

$$P(n, 4) = 12 \cdot P(n, 2)$$

$$\Rightarrow \frac{n!}{(n-4)!} = 12 \times \frac{n!}{(n-2)!} \quad \left[ \because {}^n P_r = \frac{n!}{(n-r)!} \right]$$

$$\Rightarrow \frac{1}{(n-4)!} = \frac{12}{(n-2)!}$$

$$\Rightarrow \frac{1}{(n-4)!} = \frac{12}{(n-2)(n-2-1)(n-2-2)!}$$

$$\Rightarrow \frac{1}{(n-4)!} = \frac{12}{(n-2)(n-3)(n-4)!}$$

$$\Rightarrow \frac{(n-2)(n-3)(n-4)!}{(n-4)!} = 12$$

$$\Rightarrow (n-2)(n-3) = 12$$

$$\Rightarrow n^2 - 3n - 2n + 6 = 12$$

$$\Rightarrow n^2 - 5n + 6 - 12 = 0$$

$$\Rightarrow n^2 - 5n - 6 = 0$$

$$\Rightarrow n^2 - 6n + 1n - 6 = 0$$

$$\Rightarrow n(n-6) + 1(n-6) = 0$$

$$\Rightarrow (n-6)(n+1) = 0$$

$$\Rightarrow n-6 = 0 \quad [\because n \neq -1]$$

$$\Rightarrow n = 6$$

Hence,  $n = 6$

\*\*\*\*\* END \*\*\*\*\*