

Chapter 7: Permutations and Combinations Exercise 7.2

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Questions

Question 1

Evaluate

(i) $8!$

(ii) $4! - 3!$

Solution

(i) Consider $8!$

We know that $8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$$= 40320$$

(ii) Consider $4! - 3!$

$$4! - 3! = (4 \times 3!) - 3!$$

Above equation can be written as

$$= 3! (4 - 1)$$

$$= 3 \times 2 \times 1 \times 3$$

$$= 18$$

Question 2

Is $3! + 4! = 7!?$

Solution

Consider LHS $3! + 4!$

Computing left hand side, we get

$$3! + 4! = (3 \times 2 \times 1) + (4 \times 3 \times 2 \times 1)$$

$$= 6 + 24$$

$$= 30$$

Again considering RHS and computing, we get

$$7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$$

Therefore LHS $\neq$ RHS

Therefore $3! + 4! \neq 7!$

Question 3

Compute

$$\frac{8!}{6! \times 2!}$$

Solution

Given $\frac{8!}{6! \times 2!}$

Expanding all the factorials and simplifying we get

$$\frac{8!}{6! \times 2!} = \frac{8 \times 7 \times 6!}{6! \times 2 \times 1}$$

$$\Rightarrow \frac{8!}{6! \times 2!} = \frac{8 \times 7}{2} = 28$$

Question 4

$$\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$$

If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$ find x.

Solution

Consider LHS and by computing we get

$$\begin{aligned}\frac{1}{6!} + \frac{1}{7!} &= \frac{1}{6!} + \frac{1}{7 \times 6!} \\ \Rightarrow \frac{7+1}{7 \times 6!} &= \frac{8}{7!}\end{aligned}$$

Equating LHS to RHS to get the value of x

$$\begin{aligned}\frac{8}{7!} &= \frac{x}{8!} \\ \Rightarrow \frac{8}{7!} &= \frac{x}{8 \times 7!}\end{aligned}$$

On rearranging we get

$$\Rightarrow 8 \times 8 = x$$

$$\Rightarrow x = 64.$$

Question 5

Evaluate

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

When

(i) $n = 6, r = 2$

(ii) $n = 9, r = 5$

Solution

(i) Given $n = 6$ and $r = 2$

Putting the value of n and r we get

$$\frac{6!}{(6-2)!}$$
$$\Rightarrow \frac{6!}{4!} = \frac{6 \times 5 \times 4!}{4!} = 6 \times 5 = 30.$$

(ii) Given $n = 9$ and $r = 5$

Putting the value of n and r we get

$$\frac{9!}{(9-5)!}$$
$$\Rightarrow \frac{9!}{4!} = \frac{9 \times 8 \times 7 \times 6 \times 5 \times 4!}{4!} = 9 \times 8 \times 7 \times 6 \times 5 = 15120.$$

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