Example 14

If $\frac{1}{8!}+\frac{1}{9!}=\frac{x}{10!}$, then find x.

Solution

$$\frac{1}{8!}+\frac{1}{9!}=\frac{x}{10!}$$

$$\frac{10!}{8!}+\frac{10!}{9!}=x \qquad \text{(multiplying by 10!)}$$

$$(10\times 9)+10=x$$

$$\therefore\ x=100$$

Example 15

Evaluate $\frac{n!}{r!(n-r)!}$ when $n=5, r=2$

Solution

$$\frac{n!}{r!(n-r)!}=\frac{5!}{2!(5-2)!}=\frac{5!}{2!\times 3!}=\frac{5\times 4\times 3!}{2\times 3!}=10$$

Example 16

Evaluate $\frac{n!}{(n-r)!}$, when i. $n=6, r=2$ ii. $n=9, r=5$.

Solution

i. $\frac{n!}{(n-r)!} = \frac{6!}{(6-2)!} = \frac{6!}{4!} = \frac{6\times5\times4!}{4!} = 30$

ii. $\frac{n!}{(n-r)!} = \frac{9!}{(9-5)!} = \frac{9!}{4!} = \frac{9\times8\times7\times6\times5\times4!}{4!} = 15120$

SOLUTIONS TO NCERT TEXT BOOK EXERCISE 7.2

1. Evaluate

   i. 8! ii. 4! – 3!

Solution

i. $8! = 1\times2\times3\times4\times5\times6\times7\times8 = 40320$

ii. $4! - 3! = (1\times2\times3\times4) - (1\times2\times3) = 24 - 6 = 18$

2. Is 3! + 4! = 7!?

Solution

$3! + 4! = 1\times2\times3 + 1\times2\times3\times4 = 6 + 24 = 30$

$7! = 1\times2\times3\times4\times5\times 6\times7\times = 5040$

No since $30 \neq 5040$

3. Compute $\frac{8!}{6!\times2!}$.

Solution

$\frac{8!}{6!\times2!} = \frac{8\times7\times6!}{6!\times2!} = \frac{8\times7}{1\times2} = 28$

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

Solution

$\frac{1}{6!}+\frac{1}{7!}=\frac{x}{8!} \Rightarrow \frac{8!}{6!}+\frac{8!}{7!}=x$ (multiplying by 8!)

$\therefore x = \frac{8\times7\times6!}{6!} + \frac{8\times7!}{7!}$ $(n! = n(n-1)!)$ $= 56 + 8 = 64$