Brainbox learn easy

Chapter 07

PERMUTATIONS AND COMBINATIONS

PROPERTIES OF $\binom{n}{r}$:

1) $\binom{n}{r} = \binom{n}{n-r}$

2) $\binom{n}{0} = \binom{n}{n} = 1$

3) $\binom{n}{1} = \binom{n}{n-1} = n$

4) The largest $\binom{n}{r}$ is $\binom{n}{n/2}$, if n is even.

And $\binom{n}{\frac{n-1}{2}} = \binom{n}{\frac{n+1}{2}}$, if n is odd.

5) $\binom{n}{r-1} + \binom{n}{r} = \binom{n+1}{r}$ (Pascal's rule)

6) $\binom{n}{r} \div \binom{n}{r-1} = \frac{n-r+1}{r}$

7) $\binom{n}{x} = \binom{n}{y} \Rightarrow x = y$ or $x + y = n$

8) The product of 'K' consecutive positive integers is divisible by K!.

9) ${}^{p}C_{r}$ is divisible by 'p' only. If 'p' is prime number for $r = 1, 2, 3, \ldots\ldots, (p-1)$.

EXAMPLE:

If ${}^{n}C_{8} = {}^{n}C_{6}$, then find ${}^{n}C_{2}$.

SOLUTION:

If ${}^{n}C_{x} = {}^{n}C_{y}$ and $x \neq y$, then $x + y = n$, hence

${}^{n}C_{8} = {}^{n}C_{6} \Rightarrow n = (8 + 6) = 14$

Now, ${}^{n}C_{2} = {}^{14}C_{2} = \dfrac{14 \times 13}{2} = 91.$