

**Key points and concepts**

- ${}^n C_r$  is the number of different combinations of  $n$  objects,  $r$  of one type,  $(n - r)$  of another.
- $n! = n(n - 1)(n - 2) \dots 1$

- ${}^n C_r = \frac{n!}{r!(n - r)!} = \binom{n}{r}$

- The number of arrangements of an  $n$ -letter word, with ONE letter repeated  $p$  times is  $\left(\frac{n!}{p!}\right)$
- The Binomial Theorem is given by

$$(a + x)^n = a^n + \binom{n}{1} a^{n-1} x + \binom{n}{2} a^{n-2} x^2 + \dots + \binom{n}{r} a^{n-r} x^r + \dots x^n$$

where  $a$  and  $x$  are numbers and  $n$  is a positive integer.