

Discuss with your partner(s)

1. Use Pascal's triangle to compute $\binom{6}{3}$ and $\binom{6}{4}$
2. Use the Binomial Theorem to expand each of the following:
 - (a) $(p + q)^5$
 - (b) $(u - v)^4$
 - (c) $(x - 3y)^3$
3. Find the coefficient of the given term.
 - (a) a^5b^4 in $(a + b)^9$
 - (b) u^7v^3 in $(2u - v)^{10}$
 - (c) x^8y^3 in $(2x + \frac{y}{2})^{11}$

4. Simplify each of the following:

$$(a) \sum_{k=0}^{11} \binom{n}{k} 2^{n-k} 3^k$$

$$(c) \sum_{k=0}^{15} \binom{n}{k} \frac{1}{2^k}$$

$$(b) \sum_{k=0}^{12} \binom{n}{k} 4^k$$

$$(d) \sum_{k=0}^n \binom{n}{k} 2^{n-k}$$

5. Prove $\sum_{k=2}^{n+1} \binom{k}{2} = \binom{n+2}{3} \quad \forall n \geq 1$