

6.4 Binomial Coefficients and Identities

Problem

Find the coefficient of the term for when the power of a is 17 in $(2a + 3b)^{23}$.

Recall the binomial theorem:

$$(x + y)^n = \sum_{i=0}^n \binom{n}{j} x^{n-j} y^j.$$

Here, $x = 2a$, $y = 3b$, and $n = 23$. Now consider the appropriate term:

$$\binom{23}{6} (2a)^{17} (3b)^6.$$

Then the coefficient will be:

$$2^{17} \cdot 3^6 \cdot C(23, 6) = 2^{17} \cdot 3^6 \cdot \frac{23!}{6!17!}.$$