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Binomial Theorem Ex 18.1 Q1(i)

The expansion of $(x+y)^n$ has n+1 term so, the expansion of $(2x+3y)^5$ has 6 terms.

Using binomial theorem, we have

$$(2x+3y)^5 = {}^5C_0(2x)^5(3y)^0 + {}^5C_1(2x)^4(3y)^1 + {}^5C_2(2x)^3(3y)^2 + {}^5C_3(2x)^2(3y)^3 + {}^5C_4(2x)(3y)^4 + {}^5C_5(2x)^0(3y)^5$$

$$= 2^5x^5 + 5\times 2^4 \times 3 \times x^4 \times y + 10\times 2^3 \times 3^2 \times x^3 \times y^2 + 10\times 2^2 \times 3^3 \times x^2 \times y^3 + 5\times 2\times 3^4 \times x \times y^4 + 3^5y^5$$

$$= 32x^5 + 240x^4y + 720x^3y^2 + 1080x^2y^3 + 810xy^4 + 243y^5$$

Binomial Theorem Ex 18.1 Q1(ii)

The expansion of $(x+y)^n$ has $n+1$ terms so the expansion of $(2x-3y)^4$ has 5 terms.

Using binomial theorem, we have

$$(2x-3y)^4 = {}^4C_0(2x)^4(3y)^0 - {}^4C_1(2x)^3(3y)^1 + {}^4C_2(2x)^2(3y)^2 - {}^4C_3(2x)^1(3y)^3 + {}^4C_4(2x)^0(3y)^4$$

$$= 2^4x^4 - 4\times 2^3 \times 3x^3y + 6\times 2^2 \times 3^2 \times x^2y^2 - 4\times 2\times 3^3 \times xy^3 + 3^4y^4$$

$$= 16x^4 - 96x^3y + 216x^2y^2 - 216xy^3 + 81y^4$$

Binomial Theorem Ex 18.1 Q1(iii)

The expansion of $(x+y)^n$ has $n+1$ terms so the expansion of $\left(x-\frac{1}{x}\right)^6$ has 7 term.

Using binomial theorem, we get

$$\left(x-\frac{1}{x}\right)^6 = {}^6C_0x^6\left(\frac{1}{x}\right)^0 - {}^6C_1x^5\left(\frac{1}{x}\right) + {}^6C_2x^4\left(\frac{1}{x}\right)^2 - {}^6C_3x^3\left(\frac{1}{x}\right)^3 + {}^6C_4x^2\left(\frac{1}{x}\right)^4 - {}^6C_5x\left(\frac{1}{x}\right)^5 + {}^6C_6x^0\left(\frac{1}{x}\right)^6$$

$$= x^6 - 6x^4 + 15x^2 - 20 + \frac{15}{x^2} - \frac{6}{x^4} + \frac{1}{x^6}$$

Binomial Theorem Ex 18.1 Q1(iv)

The expansion of $(x+y)^n$ has $n+1$ terms so the expansion of $(1-3x)^7$ has 8 term.
Using binomial theorem to expand, we get

$$(1-3x)^7 = {}^7C_0(1)^7(3x)^0 - {}^7C_1(3x) + {}^7C_2(3x)^2 - {}^7C_3(3x)^3 + {}^7C_4(3x)^4 - {}^7C_5(3x)^5 - {}^7C_6(3x)^6 + {}^7C_7(3x)^7$$

$$= 1 - 21x + 21\times 9x^2 - 35\times 3^3x^3 + 35\times 3^4x^4 - 21\times 3^5x^5 + 7\times 3^6x^6 - 3^7x^7$$

$$= 1 - 21x + 189x^2 - 945x^3 + 2835x^4 - 5103x^5 + 5103x^6 - 2187x^7$$

Binomial Theorem Ex 18.1 Q1(v)

The expansion of $(x+y)^n$ has $n+1$ terms so the expansion of $\left(ax-\frac{b}{x}\right)^6$ has 7 terms.
Using binomial theorem to expand, we get

$$\left(ax-\frac{b}{x}\right)^6 = {}^6C_0(ax)^6\left(\frac{b}{x}\right)^0 - {}^6C_1(ax)^5\left(\frac{b}{x}\right) + {}^6C_2(ax)^4\left(\frac{b}{x}\right)^2 - {}^6C_3(ax)^3\left(\frac{b}{x}\right)^3 + {}^6C_4(ax)^2\left(\frac{b}{x}\right)^4 - {}^6C_5(ax)\left(\frac{b}{x}\right)^5 + {}^6C_6(ax)^0\left(\frac{b}{x}\right)^6$$

$$= a^6x^6 - 6a^5x^5\frac{b}{x} + 15a^4x^4\frac{b^2}{x^2} - 20a^3b^3 + 15a^2\frac{b^4}{x^2} - 6a\frac{b^5}{x^4} + \frac{b^6}{x^6}$$

$$= a^6x^6 - 6a^5x^4b + 15a^4b^2x^2 - 20a^3b^3 + 15\frac{a^2b^4}{x^2} - 6\frac{ab^5}{x^4} + \frac{b^6}{x^6}$$

*********** END **********