SM3 1.2: Pascal's Triangle & Binomial Thm Key

Problems: Expand the binomial.

1) $(a+b)^3$

$\binom{3}{0}(a)^3(b)^0 + \binom{3}{1}(a)^2(b)^1 + \binom{3}{2}(a)^1(b)^2 + \binom{3}{3}(a)^0(b)^3$

$(1)(a^3)(1) + (3)(a^2)(b) + (3)(a)(b^2) + (1)(1)(b^3)$

$a^3 + 3a^2b + 3ab^2 + b^3$

2) $(a+b)^5$

$\binom{5}{0}(a)^5(b)^0 + \binom{5}{1}(a)^4(b)^1 + \binom{5}{2}(a)^3(b)^2 + \binom{5}{3}(a)^2(b)^3 + \binom{5}{4}(a)^1(b)^4 + \binom{5}{5}(a)^0(b)^5$

$(1)(a^5)(1) + (5)(a^4)(b) + (10)(a^3)(b^2) + (10)(a^2)(b^3) + (5)(a)(b^4) + (10)(1)(b^5)$

$a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$

3) $(a+3)^4$

$\binom{4}{0}(a)^4(3)^0 + \binom{4}{1}(a)^3(3)^1 + \binom{4}{2}(a)^2(3)^2 + \binom{4}{3}(a)^1(3)^3 + \binom{4}{4}(a)^0(3)^4$

$(1)(a^4)(1) + (4)(a^3)(3) + (6)(a^2)(9) + (4)(a)(27) + (1)(1)(81)$

$a^4 + 12a^3 + 54a^2 + 108a + 81$

4) $(x-2)^6$

$\binom{6}{0}(x)^6(-2)^0 + \binom{6}{1}(x)^5(-2)^1 + \binom{6}{2}(x)^4(-2)^2 + \binom{6}{3}(x)^3(-2)^3 + \binom{6}{4}(x)^2(-2)^4 + \binom{6}{5}(x)^1(-2)^5 + \binom{6}{6}(x)^0(-2)^6$

$(1)(x^5)(1) + (6)(x^4)(-2) + (15)(x^3)(4) + (20)(x^2)(-8) + (15)(x)(16) + (6)(1)(-32) + (1)(1)(64)$

$x^6 - 12x^5 + 60x^4 - 160x^3 + 240x^2 - 192x + 64$

5) $(2x-1)^5$

$\binom{5}{0}(2x)^5(-1)^0 + \binom{5}{1}(2x)^4(-1)^1 + \binom{5}{2}(2x)^3(-1)^2 + \binom{5}{3}(2x)^2(-1)^3 + \binom{5}{4}(2x)^1(-1)^4 + \binom{5}{5}(2x)^0(-1)^5$

$(1)(32x^5)(1) + (5)(16x^4)(-1) + (10)(8x^3)(1) + (10)(4x^2)(-1) + (5)(2x)(1) + (1)(1)(-1)$

$32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$

6) $(x+5y)^3$

$\binom{3}{0}(x)^3(5y)^0+\binom{3}{1}(x)^2(5y)^1+\binom{3}{2}(x)^1(5y)^2+\binom{3}{3}(x)^0(5y)^3$

$(1)(x^3)(1)+(3)(x^2)(5y)+(3)(x)(25y^2)+(1)(1)(125y^3)$

$x^3+15x^2y+75xy^2+125y^3$

Find the given term in the binomial expansion:

7) $x^6\ term;(x-1)^9$

$\binom{9}{6}(x)^6(-1)^{9-6}$

$\binom{9}{6}(x)^6(-1)^3$

$(84)(x^6)(-1)$

$-84x^6$

8) $x^4\ term;(2x+3)^7$

$\binom{7}{4}(2x)^4(3)^{7-4}$

$\binom{7}{4}(2x)^4(3)^3$

$(35)(16x^4)(27)$

$15120x^4$

9) $x^6y^3\ term;(x+y)^9$

$\binom{9}{6}(x)^6(y)^{9-6}$

$\binom{9}{6}(x)^6(y)^3$

$(84)(x^6)(y^3)$

$84x^6y^3$

10) $x^{11}y^2\ term;(x-2y)^{13}$

$\binom{13}{11}(x)^{11}(-2y)^{13-11}$

$\binom{13}{11}(x)^{11}(-2y)^2$

$(78)(x^{11})(4y^2)$

$312x^{11}y^2$