Binomial Expansion GREEN

1. What is the expansion of:

   a. $(a+2)^4$

   b. $(x-3)^5$

   c. $(2x-3)^3$

2. Find the coefficient of x^3 in the expansions of:

   a. $(x+2)^6$

   b. $(3+2x)^3$

   c. $(3-2x)^4$

3. Use the binomial expansion to find the first four terms, in ascending powers of x, of:

a. $(x+4)^6$

b. $(1-2x)^7$

c. $(2+5x)^4$

d. $\left(1+\frac{x}{2}\right)^8$

4. The coefficient of x^3 in the expansion of $(3+bx)^5$ is -720. Find the value of the constant b.

Binomial Expansion AMBER

1. What is the expansion of:

   a. $(a+2)^4$

   1 _____ $+ 4$ _____ $+ 6$ _____ $+ 4$ _____ $+ 1$ _____

   b. $(x-3)^5$

   c. $(2x-3)^3$

2. Find the coefficient of x^3 in the expansions of:

   a. $(x+2)^6$

   $\binom{6}{3} x^3 2^3 =$

   b. $(3+2x)^3$

   c. $(3-2x)^4$

3. Use the binomial expansion to find the first four terms, in ascending powers of x, of:

a. $(x+4)^6$

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

b. $(1-2x)^7$

c. $(2+5x)^4$

d. $\left(1+\frac{x}{2}\right)^8$

4. The coefficient of x^3 in the expansion of $(3+bx)^5$ is -720. Find the value of the constant b.

$\binom{5}{3} (bx)^3 3^2 = -720 x^3$

Binomial Expansion RED

1. What is the expansion of:

   a. $(a+2)^4$

   $1 \times a^4 \times 2^0 + 4 \times a^3 \times 2^1 + 6 \times a^2 \times 2^2 + 4 \times a^1 \times 2^3 + 1 \times a^0 \times 2^4$

   $= a^4 +$

   b. $(x-3)^5$

   1 _____ $+ 5$ _____ $+ 10$ _____ $+ 10$ _____ $+ 5$ _____ $+ 1$ _____

   c. $(2x-3)^3$

2. Find the coefficient of x^3 in the expansions of:

   a. $(x+2)^6$

   $\binom{6}{3} x^3 2^3 =$

   b. $(3+2x)^3$

   c. $(3-2x)^4$

3. Use the binomial expansion to find the first four terms, in ascending powers of x, of:

a. $(x+4)^6$

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

$= 4096 +$

b. $(1-2x)^7$

c. $(2+5x)^4$

d. $\left(1+\frac{x}{2}\right)^8$

4. The coefficient of x^3 in the expansion of $(3+bx)^5$ is -720. Find the value of the constant b.

$\binom{5}{3} (bx)^3 3^2 = -720 x^3$

Binomial Expansion ANSWERS

1. What is the expansion of:

a. $(a+2)^4$

$1\,a^4 2^0 + 4\,a^3 2^1 + 6\,a^2 2^2 + 4\,a^1 2^3 + 1\,a^0 2^4$

$= a^4 + 8a^3 + 24a^2 + 32a + 16$

b. $(x-3)^5$

$1\,x^5(-3)^0 + 5\,x^4(-3)^1 + 10\,x^3(-3)^2 + 10\,x^2(-3)^3 + 5\,x^1(-3)^4 + 1\,x^0(-3)^5$

$= x^5 - 15x^4 + 90x^3 - 270x^2 + 405x - 243$

c. $(2x-3)^3$

$1\,(2x)^3(-3)^0 + 3\,(2x)^2(-3)^1 + 3\,(2x)^1(-3)^2 + 1\,(2x)^0(-3)^3$

$= 8x^3 - 36x^2 + 54x - 27$

2. Find the coefficient of x^3 in the expansions of:

a. $(x+2)^6$

$\binom{6}{3} x^3 \cdot 2^3 = 20 \times 8 \times x^3 = 160x^3$

b. $(3+2x)^3$

$\binom{3}{3} (2x)^3 3^0 = 1 \times 8x^3 \times 1 = 8x^3$

c. $(3-2x)^4$

$\binom{4}{3} (-2x)^3 3^1 = 4 \times -8x^3 \times 3 = -96x^3$

3. Use the binomial expansion to find the first four terms, in ascending powers of x, of:

a. $(x+4)^6$

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

$= 1 \times 1 \times 4096 + 6 \times x \times 1024 + 15 \times x^2 \times 256 + 20 \times x^3 \times 64 + \cdots$

$= 4096 + 6144x + 3840x^2 + 1280x^3 + \cdots$

b. $(1-2x)^7$

$\binom{7}{0}(-2x)^0 1^7 + \binom{7}{1}(-2x)^1 1^6 + \binom{7}{2}(-2x)^2 1^5 + \binom{7}{3}(-2x)^3 1^4 + \cdots$

$= 1 \times 1 \times 1 + 7 \times -2x \times 1 + 21 \times 4x^2 \times 1 + 35 \times -8x^3 \times 1 + \cdots$

$= 1 - 14x + 84x^2 - 280x^3 + \cdots$

c. $(2+5x)^4$

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

$= 1 \times 1 \times 16 + 4 \times 5x \times 8 + 6 \times 25x^2 \times 4 + 4 \times 125x^3 \times 2 + \cdots$

$= 16 + 160x + 600x^2 + 1000x^3 + \cdots$

d. $\left(1+\frac{x}{2}\right)^8$

$\binom{8}{0}\left(\frac{x}{2}\right)^0 1^8 + \binom{8}{1}\left(\frac{x}{2}\right)^1 1^7 + \binom{8}{2}\left(\frac{x}{2}\right)^2 1^6 + \binom{8}{3}\left(\frac{x}{2}\right)^3 1^5 + \cdots$

$= 1 \times 1 \times 1 + 8 \times \frac{x}{2} \times 1 + 28 \times \frac{x^2}{4} \times 1 + 56 \times \frac{x^3}{8} \times 1 + \cdots$

$= 1 + 4x + 7x^2 + 7x^3 + \cdots$

4. The coefficient of x^3 in the expansion of $(3+bx)^5$ is -720. Find the value of the constant b.

$\binom{5}{3}(bx)^3 3^2 = -720x^3$

$90b^3x^3 = -720x^3$

$b^3 = -8$

$b = -2$