LESSON MAKER PRO

Binomial Power Play

Expand powers into equivalent polynomials.

HIGH SCHOOL · MA.912.AR.1.11

MA.912.AR.1.11 "Apply the Binomial Theorem to create equivalent polynomial expressions."

NAME _____ DATE _____

EXPAND A BINOMIAL

To expand (a+b)^n, use the binomial coefficients for that power and multiply each coefficient by powers of both terms. Start with the first term at its highest power and decrease its exponent by 1 each time. If the binomial has subtraction, treat the second term as negative.

WORKED EXAMPLE

Expand (6x+5)^3.

1. Use coefficients 1, 3, 3, 1: (6x+5)^3 = (6x)^3 + 3(6x)^2(5) + 3(6x)(5)^2 + 5^3.
2. Evaluate each term: 216x^3 + 540x^2 + 450x + 125.

Answer: 216x^3 + 540x^2 + 450x + 125

PRACTICE 6 problems

1 Expand (x+7)^2.

ANSWER _____

2 Expand (2x-1)^4.

ANSWER _____

3 Expand (4x-8)^2.

ANSWER _____

4 Expand (x+9)^4.

ANSWER _____

5 Expand (7x+1)^2.

ANSWER _____

6 Expand (2x^2-1)^4.

ANSWER _____

APPLY IT Show your work

1 A game designer creates a square arena with side length (2x+1) meters. Write an expanded polynomial for the area of the arena.

WORK SPACE

ANSWER _____

2 A robotics club designs a cube-shaped protective case with edge length (x-7) centimeters. Write an expanded polynomial for the volume of the case.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Expand (4x^2+7)^4 and write the result in descending powers of x.

_____

_____

ANSWER KEY

Binomial Power Play

HIGH SCHOOL · MA.912.AR.1.11

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Expand (x+7)^2.	**x^2 + 14x + 49**
2	Expand (2x-1)^4.	**16x^4 - 32x^3 + 24x^2 - 8x + 1**
3	Expand (4x-8)^2.	**16x^2 - 64x + 64**
4	Expand (x+9)^4.	**x^4 + 36x^3 + 486x^2 + 2916x + 6561**
5	Expand (7x+1)^2.	**49x^2 + 14x + 1**
6	Expand (2x^2-1)^4.	**16x^8 - 32x^6 + 24x^4 - 8x^2 + 1**

PART 2 · APPLY IT

1. **4x^2 + 4x + 1** The area of a square is side squared, so use (2x+1)^2. Expand with coefficients 1, 2, 1.
2. **x^3 - 21x^2 + 147x - 343** The volume of a cube is edge cubed, so use (x-7)^3. The negative second term causes the signs to alternate.

CHALLENGE

256x^8 + 1792x^6 + 4704x^4 + 5488x^2 + 2401

Accept equivalent expanded polynomials with terms in any order, although descending powers are preferred. Check that students use the correct binomial coefficients and signs.