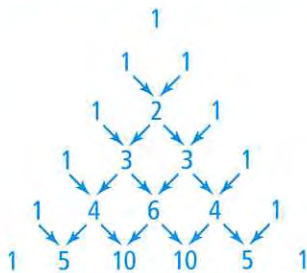


EXPLORE & REASON

Look at the following triangle. Each number is the sum of the two numbers diagonally above. If there is not a second number, think of it as 0.



A. Write the numbers in the next 3 rows.

B. **Look for Relationships** What other patterns do you see? © MP.7

C. Write a formula for the sum of the numbers in the n^{th} row of the triangle.

HABITS OF MIND

Look for Relationships Create a triangle that starts with 2 instead of 1. How does this new triangle relate to the original triangle? © MP.7

**EXAMPLE 1** **Try It! Prove a Polynomial Identity**

1. Prove the Difference of Cubes Identity.

HABITS OF MIND

Reason Is the trinomial factor in the Difference of Cubes Identity a perfect square trinomial? Explain. © MP.2

EXAMPLE 2 **Try It! Use Polynomial Identities to Multiply Polynomials**

2. Use polynomial identities to multiply each expression.

a. $(3x^2 + 5y^3)(3x^2 - 5y^3)$

b. $(12 + 15)^2$

EXAMPLE 3 **Try It! Use Polynomial Identities to Factor Polynomials**

3. Use polynomial identities to factor each polynomial or simplify each expression.

a. $m^8 - 9n^{10}$

b. $27x^9 - 343y^6$

c. $12^3 + 2^3$

HABITS OF MIND

Look for Relationships What binomial has factors $(a - 3b)$ and $(a^2 + 3ab + 9b^2)$? © MP.7



**EXAMPLE 4** **Try It!** Expand a Power of a Binomial

4. Use Pascal's Triangle to expand $(x + y)^6$.

EXAMPLE 5 **Try It!** Apply the Binomial Theorem

5. Use the Binomial Theorem to expand each expression.

a. $(x - 1)^7$

b. $(2c + d)^6$

HABITS OF MIND

Use Structure For what binomial expression is the expansion $243x^5 - 405x^4y^2 + 270x^3y^4 - 90x^2y^6 + 15xy^8 - y^{10}$? © MP.7

Do You UNDERSTAND?

- ESSENTIAL QUESTION** How can you use polynomial identities to rewrite expressions efficiently?
- Reason** Explain why the middle term of $(x + 5)^2$ is $10x$. © MP.2
- Communicate Precisely** How are Pascal's Triangle and a binomial expansion, such as $(a + b)^5$, related? © MP.6
- Use Structure** Explain how to use a polynomial identity to factor $8x^6 - 27y^3$. © MP.7
- Make Sense and Persevere** What does C_3 represent in the expansion $C_0a^5 + C_1a^4b + C_2a^3b^2 + C_3a^2b^3 + C_4ab^4 + C_5b^5$? © MP.1
- Error Analysis** Dakota said the third term of the expansion of $(2g + 3h)^4$ is $54gh^3$. Explain Dakota's error. Then correct the error. © MP.3

Do You KNOW HOW?

Use polynomial identities to multiply each expression.

7. $(2x + 8y)(2x - 8y)$

8. $(x + 3y^3)^2$

Use polynomial identities to factor each polynomial.

9. $36a^6 - 4b^2$

10. $8x^6 - y^3$

11. $m^9 + 27n^6$

Find the term of each binomial expansion.

12. fifth term of $(x + y)^5$

13. third term of $(a - 3)^6$

Use Pascal's Triangle to expand each expression.

14. $(x + 1)^5$

15. $(a - b)^6$

Use the Binomial Theorem to expand each expression.

16. $(d - 1)^4$

17. $(x + y)^7$