NAME

Module 12 Simplifying Algebraic Expressions by Factoring Polynomials

Lesson 3 Factoring The Difference of Two Squares

Factor completely, if possible.

1. $c^2 - 36$

   $(c + 6)(c - 6)$

2. $g^2 - 4$

   $(g + 2)(g - 2)$

3. $w^2 + 9$

   Cannot be factored

4. $j^2 - 9$

   $(j - 3)(j + 3)$

5. $9 - m^2$

   $(3 - m)(3 + m)$

6. $x^2 - 100$

   $(x - 10)(x + 10)$

7. $b^4 - 25$

   $(b^2 - 5)(b^2 + 5)$

8. $a^6 - 9$

   $(a^3 - 3)(a^3 + 3)$

9. $f^5 - 16$

   Cannot be factored

10. $c^4 - 16$

    $(c^2 + 4)(c + 2)(c - 2)$

11. $81 - j^8$

    $(9 + j^4)(3 + j^2)(3 - j^2)$

12. $x^8 - 1$

    $(x - 1)(x + 1)(x^2 + 1)(x^4 + 1)$

13. $c^2 - d^2$

    $(c - d)(c + d)$

14. $m^2 - 16n^2$

    $(m - 4n)(m + 4n)$

15. $a^6 - 121b^4$

    $(a^3 - 11b^2)(a^3 + 11b^2)$

16. $169 - 196z^2$

    $(13 - 14z)(13 + 14z)$

17. $64u^{10} - 225v^{12}$

    $(8u^5 - 15v^6)(8u^5 + 15v^6)$

18. $441x^6 - 256y^{14}$

    $(21x^3 - 16y^7)(21x^3 + 16y^7)$

19. $16x^8 - 81y^4$

    $(2x^2 - 3y)(2x^2 + 3y)(4x^4 + 9y^2)$

20. $256a^{12} - 81b^4$

    $(4a^3 - 3b)(4a^3 + 3b)(16a^6 + 9b^2)$

21. $a^8 - c^4$

$(a^2 - c)(a^2 + c)(a^4 + c^2)$

22. $m^{16} - n^8$

$(m^2 - n)(m^2 + n)(m^4 + n^2)(m^8 + n^4)$

23. $16c^2d^4 - 25$

$(4cd^2 - 5)(4cd^2 + 5)$

24. $4 - 49s^4t^2$

$(2 - 7s^2t)(2 + 7s^2t)$

Journal

1. Margo missed class the day the teacher taught the class to factor a difference of two squares. Explain the process used to factor a difference of two squares to her.
2. Describe a method to identify a polynomial as a difference of two squares.
3. Jimmy says that $16a^4 - 81b^8$ is factored completely as $(4a^2 + 9b^4)(4a^2 - 9b^4)$. Cindy says that he is incorrect. Who is correct? Explain.
4. Explain how to use factoring the difference of two squares to find the value of $51^2 - 49^2$.
5. Explain how to check the answer when factoring the difference of two squares.

Cumulative Review

Simplify.

1. $(f^2 - 2f + 6) + (8f^2 + 4f - 8)$

$9f^2 + 2f - 2$

2. $(4n^2 + 6n - 3) - (7n^2 + 4n - 8)$

$-3n^2 + 2n + 5$

3. $2xy(x^2 + 3x + 7)$

$2x^3y + 6x^2y + 14xy$

4. $(a + 2b)(a - 4b)$

$a^2 - 2ab - 8b^2$

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

$c^3 - 3c^2 - 6c + 8$

6. $(4x^2 + 11x - 3) \div (4x - 1)$

$x + 3$

Factor, if possible.

7. $8y^{12} + 20y^4$

$4y^4(2y^8 + 5)$

8. $10x^2y^5 - 12xy^3 - 18x^5y^4$

$2xy^3(5xy^2 - 6 - 9x^4y)$

9. $2ab - 12a + 3b - 18$

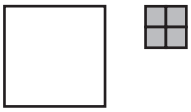
$(2a + 3)(b - 6)$

10. $14y^2 + 6y - 28yz - 12z$

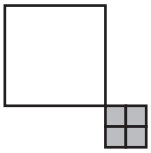
$(7y + 3)(2y - 4z)$

Manipulatives

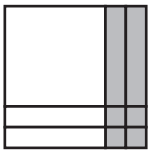
Use algebra tiles to factor $x^2 - 4$.
Model $x^2 - 4$ with tiles. Use one positive x-squared tile and four negative one tiles.



Arrange the tiles as two squares with their corners touching.



Fill in the extra space to make a rectangle by adding two zero pairs.



The length is $x + 2$. The width is $x - 2$.
The answer is $(x + 2)(x - 2)$.

Factor using algebra tiles.

1. $x^2 - 36$

$(x - 6)(x + 6)$

2. $m^2 - 25$

$(m - 5)(m + 5)$

3. $4a^2 - 9$

$(2a - 3)(2a + 3)$

4. $j^2 - 1$

$(j - 1)(j + 1)$

Possible Journal Answers

1. Find the square root of both terms. Then, write these square roots as the product of their sum and their difference.

2. A difference of two squares has two terms. The absolute values of both terms are perfect squares. The terms have opposite signs.

3. Cindy is correct. $4a^2 - 9b^4$ will factor to become $(2a - 3b^2)(2a + 3b^2)$.

4. By the difference of squares, the expression $51^2 - 49^2$ equals $(51 - 49)(51 + 49)$. This is equivalent to 2(100) or 200.

5. To check the answer, use the FOIL Method to multiply the binomial factors. If the middle terms combine to equal zero and the product is the original difference of squares, then the answer is correct.