


8-1 Adding and Subtracting Polynomials

Name: _____

Date: _____

Do Now:

Prefix	Means	Word that starts with that prefix		Example
Mono-		Ex: Monocle 	Monomial	
Bi-			Binomial	
Tri-			Trinomial	
Poly-			Polynomial	

The prefix for a polynomial is determined by the number of **terms**. **Terms** are separated by a or a .

***Monomials CANNOT have a _____ power.

The degree of a polynomial is greatest degree of any term. Ex:

Ex:

Example 1 Identify Polynomials

Determine whether each expression is a polynomial. If it is a polynomial, find the degree and determine whether it is a *monomial*, *binomial*, or *trinomial*.

Expression	Is it a polynomial?	Degree	Monomial, binomial, or trinomial?
a. $4y - 5$			
b. -6.5			
c. $7a^{-3} + 9b$			
d. $6x^3 + 4x + x + 3$			

1A. x

1C. $5rx + 7tuv$

1B. $-3y^2 - 2y + 4y - 1$

1D. $10x^{-4} - 8x^a$

Example 2 Standard Form of a Polynomial

Write each polynomial in standard form. Identify the leading coefficient.

a. $3x^2 + 4x^5 - 7x$

b. $5y - 9 - 2y^4 - 6y^3$

2A. $8 - 2x^2 + 4x^4 - 3x$

2B. $y + 5y^3 - 2y^2 - 7y^6 + 10$

Example 3 Add Polynomials

Find each sum.

a. $(2x^2 + 5x - 7) + (3 - 4x^2 + 6x)$

b. $(3y + y^3 - 5) + (4y^2 - 4y + 2y^3 + 8)$

3A. $(5x^2 - 3x + 4) + (6x - 3x^2 - 3)$

3B. $(y^4 - 3y + 7) + (2y^3 + 2y - 2y^4 - 11)$

Example 4 Subtract Polynomials

Find each difference.

a. $(3 - 2x + 2x^2) - (4x - 5 + 3x^2)$

b. $(7p + 4p^3 - 8) - (3p^2 + 2 - 9p)$

4. $(4x^3 - 3x^2 + 6x - 4) - (-2x^3 + x^2 - 2)$

Real-World Example 5 Add and Subtract Polynomials

ELECTRONICS The equations $P = 7m + 137$ and $C = 4m + 78$ represent the number of smartphones P and gaming consoles C sold in m months at an electronics store. Write an equation for the total monthly sales T of phones and gaming consoles. Then predict the number of phones and gaming consoles sold in 10 months.

Guided Practice

5. Use the information above to write an equation that represents the difference in the monthly sales of smartphones and the monthly sales of gaming consoles. Use the equation to predict the difference in monthly sales in 24 months.

Check Your Understanding

Example 1 Determine whether each expression is a polynomial. If it is a polynomial, find the degree and determine whether it is a *monomial*, *binomial*, or *trinomial*.

1. $7ab + 6b^2 - 2a^3$

2. $2y - 5 + 3y^2$

3. $3x^2$

4. $\frac{4m}{3p}$

5. $5m^2p^3 + 6$

6. $5q^{-4} + 6q$

Example 2 Write each polynomial in standard form. Identify the leading coefficient.

7. $2x^5 - 12 + 3x$

8. $-4d^4 + 1 - d^2$

9. $4z - 2z^2 - 5z^4$

10. $2a + 4a^3 - 5a^2 - 1$

Examples 3–4 Find each sum or difference.

11. $(6x^3 - 4) + (-2x^3 + 9)$

12. $(g^3 - 2g^2 + 5g + 6) - (g^2 + 2g)$

13. $(4 + 2a^2 - 2a) - (3a^2 - 8a + 7)$

14. $(8y - 4y^2) + (3y - 9y^2)$

15. $(-4z^3 - 2z + 8) - (4z^3 + 3z^2 - 5)$

16. $(-3d^2 - 8 + 2d) + (4d - 12 + d^2)$

8-1 Practice

Adding and Subtracting Polynomials

Find each sum or difference.

1. $(4y + 5) + (-7y - 1)$

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

3. $(4k^2 + 8k + 2) - (2k + 3)$

4. $(2m^2 + 6m) + (m^2 - 5m + 7)$

5. $(5a^2 + 6a + 2) - (7a^2 - 7a + 5)$

6. $(-4p^2 - p + 9) + (p^2 + 3p - 1)$

7. $(x^3 - 3x + 1) - (x^3 + 7 - 12x)$

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

9. $(4y^2 + 2y - 8) - (7y^2 + 4 - y)$

10. $(w^2 - 4w - 1) + (-5 + 5w^2 - 3w)$

Determine whether each expression is a polynomial. If it is a polynomial, find the degree and determine whether it is a *monomial*, *binomial*, or *trinomial*.

11. $7a^2b + 3b^2 - a^2b$

12. $\frac{1}{5}y^3 + y^2 - 9$

13. $6g^2h^3k$

14. $\frac{x + 3x^4 - 21x^2}{x^3}$

Write each polynomial in standard form. Identify the leading coefficient.

15. $8x^2 - 15 + 5x^5$

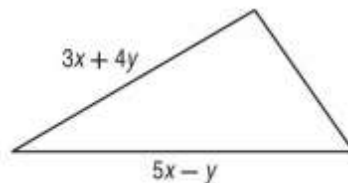
16. $10x - 7 + x^4 + 4x^3$

17. $13x^2 - 5 + 6x^3 - x$

18. $4x + 2x^5 - 6x^3 + 2$

19. **BUSINESS** The polynomial $s^3 - 70s^2 + 1500s - 10,800$ models the profit a company makes on selling an item at a price s . A second item sold at the same price brings in a profit of $s^3 - 30s^2 + 450s - 5000$. Write a polynomial that expresses the total profit from the sale of both items.

20. **GEOMETRY** The measures of two sides of a triangle are given. If P is the perimeter, and $P = 10x + 5y$, find the measure of the third side.



8.2 Multiplying a monomial by a polynomial

Name:

Date:

Learning Target: Today I will learn how to

Do Now:

Example 1 Multiply a Polynomial by a Monomial Simplify

Find $-3x^2(7x^2 - x + 4)$.

1A. $5a^2(-4a^2 + 2a - 7)$

1B. $-6d^3(3d^4 - 2d^3 - d + 9)$

Example 2 Simplify Expressions

Simplify $2p(-4p^2 + 5p) - 5(2p^2 + 20)$.

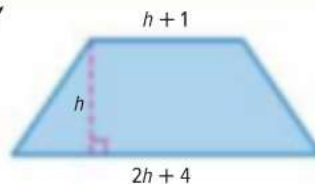
2A. $3(5x^2 + 2x - 4) - x(7x^2 + 2x - 3)$

2B. $15t(10y^3t^5 + 5y^2t) - 2y(yt^2 + 4y^2)$

Real-World Example 3 Write and Evaluate a Polynomial Expression

DANCE The theme for a school dance is "Solid Gold."

For one decoration, Kana is covering a trapezoid-shaped piece of poster board with metallic gold paper to look like a bar of gold. If the height of the poster board is 18 inches, how much metallic paper will Kana need in square inches?



$$Area_{Trap} = \frac{1}{2}h(b_1 + b_2)$$

3. **DANCE** Kachima is making triangular bandanas for the dogs and cats in her pet club. The base of the bandana is the length of the collar with 4 inches added to each end to tie it on. The height is $\frac{1}{2}$ of the collar length.
- A. If Kachima's dog has a collar length of 12 inches, how much fabric does she need in square inches?
- B. If Kachima makes a bandana for her friend's cat with a 6-inch collar, how much fabric does Kachima need in square inches?

Example 4 Equations with Polynomials on Both Sides

Solve $2a(5a - 2) + 3a(2a + 6) + 8 = a(4a + 1) + 2a(6a - 4) + 50$.

4A. $2x(x + 4) + 7 = (x + 8) + 2x(x + 1) + 12$

4B. $d(d + 3) - d(d - 4) = 9d - 16$

Performance of Understanding: Simplify 1-4. Solve 5-6

1. $6g^2(3g^3 + 4g^2 + 10g - 1)$

2. $-3p^4r^3(2p^2r^4 - 6p^6r^3 - 5)$

3. $x(3x^2 + 4) + 2(7x - 3)$

4. $-2d(d^3c^2 - 4dc^2 + 2d^2c) + c^2(dc^2 - 3d^4)$

5. $-2(w + 1) + w = 7 - 4w$

6. $n(n - 4) + n(n + 8) = n(n - 13) + n(n + 1) + 16$

7. $-2(w + 1) + w = 7 - 4w$

8. $n(n - 4) + n(n + 8) = n(n - 13) + n(n + 1) + 16$

8-2 Practice

Multiplying a Polynomial by a Monomial

Find each product.

1. $2h(-7h^2 - 4h)$

2. $6pq(3p^2 + 4q)$

3. $5jk(3jk + 2k)$

4. $-3rt(-2t^2 + 3r)$

5. $-\frac{1}{4}m(8m^2 + m - 7)$

6. $-\frac{2}{3}n^2(-9n^2 + 3n + 6)$

Simplify each expression.

7. $-2\ell(3\ell - 4) + 7\ell$

8. $5w(-7w + 3) + 2w(-2w^2 + 19w + 2)$

9. $6t(2t - 3) - 5(2t^2 + 9t - 3)$

10. $-2(3m^3 + 5m + 6) + 3m(2m^2 + 3m + 1)$

Solve each equation.

12. $5(2t - 1) + 3 = 3(3t + 2)$

13. $3(3u + 2) + 5 = 2(2u - 2)$

14. $4(8n + 3) - 5 = 2(6n + 8) + 1$

15. $8(3b + 1) = 4(b + 3) - 9$

16. $t(t + 4) - 1 = t(t + 2) + 2$

17. $u(u - 5) + 8u = u(u + 2) - 4$

18. **NUMBER THEORY** Let x be an integer. What is the product of twice the integer added to three times the next consecutive integer?

19. **INVESTMENTS** Kent invested \$5000 in a retirement plan. He allocated x dollars of the money to a bond account that earns 4% interest per year and the rest to a traditional account that earns 5% interest per year.

- a. Write an expression that represents the amount of money invested in the traditional account.
- b. Write a polynomial model in simplest form for the total amount of money T Kent has invested after one year.
(*Hint:* Each account has $A + IA$ dollars, where A is the original amount in the account and I is its interest rate.)
- c. If Kent put \$500 in the bond account, how much money does he have in his retirement plan after one year?

8.3 Multiplying Polynomials

Name:

Date:

Learning Target: Today I will learn how to

Do Now:

Example 1 The Distributive Property

Find each product.

a. $(2x + 3)(x + 5)$

b. $(x - 2)(3x + 4)$

c. $(2y - 7)(3y + 5)$

d. $(4a - 5)(2a - 9)$

e. $(x + 3)(x - 4)$

g. $(2y - 5)(y - 6)$

h. $(5r + 7)(5r - 7)$

i. $(12t - 5)(12t + 5)$

Example 2A: Real life Scenario

SWIMMING POOL A contractor is building a deck around a rectangular swimming pool. The deck is x feet from every side of the pool. Write an expression for the total area of the pool and deck.

2B. A walkway surrounds a rectangular garden. The width of the garden is 8 feet, and the length is 6 feet. The width x of the walkway around the garden is the same on every side. Write an expression that represents the total area of the garden and the walkway.

Example 3: Finding products of polynomials

3A. $(6x + 5)(2x^2 - 3x - 5)$

3B. $(2y^2 + 3y - 1)(3y^2 - 5y + 2)$

3C. $(3x - 5)(2x^2 + 7x - 8)$

3D. $(m^2 + 2m - 3)(4m^2 - 7m + 5)$

8-3 Practice

Multiplying Polynomials

Find each product.

1. $(q + 6)(q + 5)$

2. $(x + 7)(x + 4)$

3. $(n - 4)(n - 6)$

4. $(a + 5)(a - 6)$

5. $(4b + 6)(b - 4)$

6. $(2x - 9)(2x + 4)$

7. $(6a - 3)(7a - 4)$

8. $(2x - 2)(5x - 4)$

9. $(3a - b)(2a - b)$

10. $(4g + 3h)(2g + 3h)$

11. $(m + 5)(m^2 + 4m - 8)$

12. $(t + 3)(t^2 + 4t + 7)$

13. $(2h + 3)(2h^2 + 3h + 4)$

14. $(3d + 3)(2d^2 + 5d - 2)$

15. $(3q + 2)(9q^2 - 12q + 4)$

16. $(3r + 2)(9r^2 + 6r + 4)$

17. $(3n^2 + 2n - 1)(2n^2 + n + 9)$

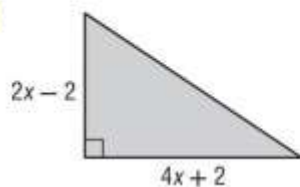
18. $(2t^2 + t + 3)(4t^2 + 2t - 2)$

19. $(2x^2 - 2x - 3)(2x^2 - 4x + 3)$

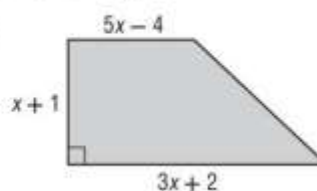
20. $(3y^2 + 2y + 2)(3y^2 - 4y - 5)$

GEOMETRY Write an expression to represent the area of each figure.

21.



22.



23. **NUMBER THEORY** Let x be an even integer. What is the product of the next two consecutive even integers?

24. **GEOMETRY** The volume of a rectangular pyramid is one third the product of the area of its base and its height. Find an expression for the volume of a rectangular pyramid whose base has an area of $3x^2 + 12x + 9$ square feet and whose height is $x + 3$ feet.

8.4 Special Products

Name:

Date:

Learning Target: Today I will learn how to –

Do Now: Simplify each of the following

1. $(x + 4)(x + 4)$

2. $(x + 2)(x + 2)$

3. $(x - 3)(x - 3)$

Draw a picture of $(x + 4)^2$

Draw a picture of $(a + b)^2$

Example 1 Square of a Sum

Find $(3x + 5)^2$.

Find each product.

1A. $(8c + 3d)^2$

1B. $(3x + 4y)^2$

Example 2 Square of a Difference

Find $(2x - 5y)^2$.

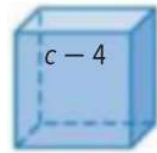
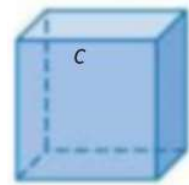
Find each product.

2A. $(6p - 1)^2$

2B. $(a - 2b)^2$

Real-World Example 3 Square of a Difference

PHYSICAL SCIENCE Each edge of a cube of aluminum is 4 centimeters less than each edge of a cube of copper. Write an equation to model the surface area of the aluminum cube.



3. **GARDENING** Alano has a garden that is g feet long and g feet wide. He wants to add 3 feet to the length and the width.
- A. Show how the new area of the garden can be modeled by the square of a binomial.
- B. Find the square of this binomial.

Example 4 Product of a Sum and a Difference

Find $(2x^2 + 3)(2x^2 - 3)$.

Find each product.

4A. $(3n + 2)(3n - 2)$

4B. $(4c - 7d)(4c + 7d)$

Performance of Understanding

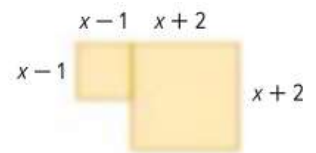
1. $(x + 5)^2$

2. $(11 - a)^2$

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

4. $(3m - 4)(3m - 4)$

Write a polynomial that finds the area of the figure to the right.



8-4 Practice

Special Products

Find each product.

1. $(n + 9)^2$

2. $(q + 8)^2$

3. $(x - 10)^2$

4. $(r - 11)^2$

5. $(p + 7)^2$

6. $(b + 6)(b - 6)$

7. $(z + 13)(z - 13)$

8. $(4j + 2)^2$

9. $(5w - 4)^2$

10. $(6h - 1)^2$

11. $(3m + 4)^2$

12. $(7v - 2)^2$

13. $(7k + 3)(7k - 3)$

14. $(4d - 7)(4d + 7)$

15. $(3g + 9h)(3g - 9h)$

16. $(4q + 5t)(4q - 5t)$

17. $(a + 6u)^2$

18. $(5r + p)^2$

19. $(6h - m)^2$

20. $(k - 6y)^2$

21. $(u - 7p)^2$

22. $(4b - 7v)^2$

23. $(6n + 4p)^2$

24. $(5q + 6t)^2$

25. $(6a - 7b)(6a + 7b)$

26. $(8h + 3d)(8h - 3d)$

27. $(9x + 2y^2)^2$

28. $(3p^3 + 2m)^2$

29. $(5a^2 - 2b)^2$

30. $(4m^3 - 2t)^2$

31. $(6b^3 - g)^2$

32. $(2b^2 - g)(2b^2 + g)$

33. $(2v^2 + 3x^2)(2v^2 + 3x^2)$

34. **GEOMETRY** Janelle wants to enlarge a square graph that she has made so that each side of the new graph will be 1 inch more than twice the original side g . What trinomial represents the area of the enlarged graph?

35. **GENETICS** In a guinea pig, pure black hair coloring B is dominant over pure white coloring b . Suppose two hybrid Bb guinea pigs, with black hair coloring, are bred.

a. Find an expression for the genetic make-up of the guinea pig offspring.

b. What is the probability that two hybrid guinea pigs with black hair coloring will produce a guinea pig with white hair coloring?

8.5 Using the Distributive Property

Name:

Date:

Learning Target: Today I will learn how to

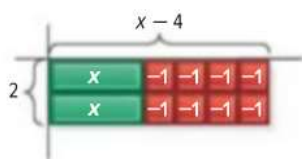
Do Now:

Activity 1 Use Algebra Tiles to Factor $2x - 8$

Step 1 Model $2x - 8$.



Step 2 Arrange the tiles into a rectangle. The total area of the rectangle represents the product, and its length and width represent the factors.



The rectangle has a width of 2 and a length of $x - 4$. Therefore, $2x - 8 = 2(x - 4)$.

Vocabulary

Factoring –

Example 1 Use the Distributive Property

Use the Distributive Property to factor each polynomial.

a. $27y^2 + 18y$

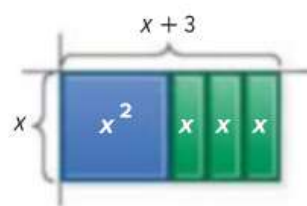
1A. $15w - 3v$

Activity 2 Use Algebra Tiles to Factor $x^2 + 3x$

Step 1 Model $x^2 + 3x$.



Step 2 Arrange the tiles into a rectangle.



The rectangle has a width of x and a length of $x + 3$. Therefore, $x^2 + 3x = x(x + 3)$.

1B. $7u^2t^2 + 21ut^2 - ut$

Real-World Example 2 Use Factoring

AGILITY Penny is a Fox Terrier who competes with her trainer in the agility course. Within the course, Penny must leap over a hurdle. The expression $20t - 16t^2$ models the height of the leap in inches after t seconds. Factor the expression. Then find the height of Penny's leap after 0.5 second.

2. **KANGAROOS** The height of a kangaroo's hop in inches after t seconds can be modeled by $24t - 16t^2$. Factor the expression. Then find the height of the kangaroo after 1 second.

Key Concept Factoring by Grouping

Words A polynomial can be factored by grouping only if all of the following conditions exist.

- There are four or more terms.
- Terms have common factors that can be grouped together.
- There are two common factors that are identical or additive inverses of each other.

Symbols $ax + bx + ay + by = \dots$
 $= \dots$
 $= \dots$

Example 3 Factor by Grouping

Factor each polynomial.

a. $4qr + 8r + 3q + 6$

b. $2u^2v - 15 - 6u^2 + 5v$

3A. $rn + 5n - r - 5$

3B. $3np + 15p - 4n - 20$

3C. $tw^3 - 2w^3 + 10t - 20$

3D. $4ab^2 + 21 + 12b^2 + 7a$

Example 4 Factor by Grouping with Additive Inverses

Factor each polynomial.

a. $2mk - 12m + 42 - 7k$

b. $21b^4 - 3ab^4 + 4a - 28$

Factor each polynomial.

4A. $c - 2cd + 8d - 4$

4B. $3p - 2p^2 - 18p + 27$

8.6 Factoring Trinomials

Name:

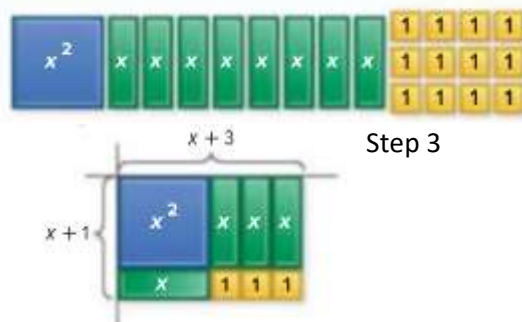
Date:

Do Now:

Activity 2 Factor $x^2 + bx + c$

Use algebra tiles to factor $x^2 + 8x + 12$.

Step 1 Model $x^2 + 8x + 12$.

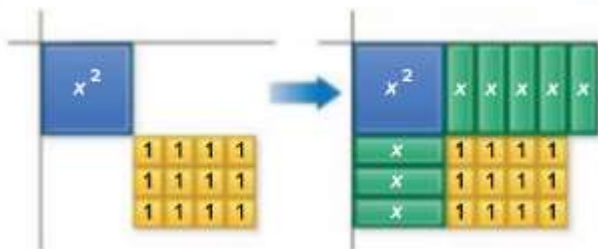


Activity 2 Factor $x^2 + bx + c$

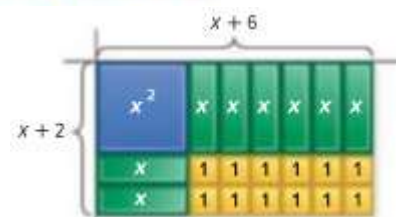
Use algebra tiles to factor $x^2 + 8x + 12$.

Step 1 Model $x^2 + 8x + 12$.

Step 2



Step 3



Example 1 b and c are Positive

Factor $x^2 + 9x + 20$.

1A. $d^2 + 11d + 24$

1B. $9 + 10t + t^2$

Example 2 b is Negative and c is Positive

Factor $x^2 - 8x + 12$. Confirm your answer using a graphing calculator.

2A. $21 - 22m + m^2$

2B. $w^2 - 11w + 28$

Example 3 c is Negative

Factor each polynomial. Confirm your answers using a graphing calculator.

a. $x^2 + 2x - 15$

b. $x^2 - 7x - 18$

3A. $y^2 + 13y - 48$

3B. $r^2 - 2r - 24$

Example 4 Factor $ax^2 + bx + c$

Factor each trinomial.

a. $7x^2 + 29x + 4$

b. $5x^2 + 12x - 9$

4A. $5x^2 + 13x + 6$

4B. $6x^2 + 22x - 8$

Example 5 Factor $ax^2 - bx + c$ Factor $3x^2 - 17x + 20$.

5A. $2n^2 - n - 1$

5B. $10y^2 - 35y + 30$

Check Your Understanding

= Step-by-Step Solutions begin on page R11.

Examples 1–3 Factor each polynomial. Confirm your answers using a graphing calculator.

1. $x^2 + 14x + 24$

2. $y^2 - 7y - 30$

3. $n^2 + 4n - 21$

4. $m^2 - 15m + 50$

Examples 4–6 Factor each polynomial, if possible. If the polynomial cannot be factored using integers, write *prime*.

5. $4x^2 - 30x + 36$

6. $6x^2 - x - 14$

7. $3x^2 + 17x + 10$

8. $2x^2 + 22x + 56$

9. $5x^2 - 3x + 4$

10. $3x^2 - 11x - 20$

8-6 Practice

Factoring Quadratic Trinomials

Factor each polynomial, if possible. If the polynomial cannot be factored using integers, write *prime*.

1. $a^2 + 10a + 24$

2. $h^2 + 12h + 27$

3. $4x^2 + 4x - 3$

4. $g^2 - 2g - 63$

5. $8w^2 - 18w + 9$

6. $y^2 + 4y - 60$

7. $b^2 + 4b - 32$

8. $n^2 - 3n - 28$

9. $t^2 + 4t - 45$

10. $15n^2 - n - 28$

11. $d^2 - 16d + 63$

12. $x^2 - 11x + 24$

13. $q^2 - q - 56$

14. $x^2 - 6x - 55$

15. $18h^2 + 15h - 18$

16. $48 - 16g + g^2$

17. $j^2 - 9jk - 10k^2$

18. $m^2 - mv - 56v^2$

19. $2b^2 + 10b + 12$

20. $3g^2 + 8g + 4$

21. $x^2 + 14x + 33$

22. $8b^2 - 5b - 10$

23. $6m^2 + 7m - 3$

24. $10d^2 + 17d - 20$

25. $6a^2 - 17a + 12$

26. $w^2 + w - 56$

27. $10x^2 - 9x + 6$

28. $z^2 - 11z + 30$

29. $10x^2 + 21x - 10$

30. $9r^2 + 15r + 6$

31. $12y^2 - 4y - 5$

32. $14k^2 - 9k - 18$

33. $8z^2 + 20z - 48$

34. $12q^2 + 34q - 28$

35. $32 + 18r + r^2$

36. $12p^2 - 22p - 20$

37. Find all values of k so that the trinomial $x^2 + kx - 35$ can be factored using integers.

38. **CONSTRUCTION** A construction company is planning to pour concrete for a driveway. The area of the driveway is represented by the expression $w^2 + 14w - 32$. Factor the expression for the area of the driveway.

39. **TENNIS** Jacob hit a tennis ball into the air. The height of the tennis ball in feet is represented by the expression $-16t^2 - 16t + 32$, t is time in seconds. Factor the expression for the height of the tennis ball.

8-7 Factoring Special Products

Name:

Date:

Learning Target:

Do Now:

Difference of squares

$$a^2 - b^2 = a^2 + 0 - b^2 = (a + b)(a - b)$$

$$x^2 - 9 = x^2 + 0x - 3^2 = \underline{\hspace{2cm}}$$

Perfect square trinomials

$$a^2 + 2ab + b^2 = (a + b)(a + b) = (a + b)^2$$

$$x^2 + 8x + 16 = (x + 4)(x + 4) = \underline{\hspace{2cm}}$$

Example 1 Factor Differences of Squares

Determine whether each polynomial is a difference of squares. Write *yes* or *no*.
If so, factor it.

a. $16h^2 - 9a^2$

b. $121c^4 - 25d^3$

1A. $81 - c^2$

1B. $36n^2 - 27m^4$

1C. $25y^2 + 1$

1D. $64g^2 - h^2$

Example 2 Recognize and Factor Perfect Square Trinomials

Determine whether each trinomial is a perfect square trinomial. Write *yes* or *no*.
If so, factor it.

a. $4y^2 + 12y + 9$

b. $9x^2 - 6x + 4$

2A. $9y^2 + 24y + 16$

2B. $2a^2 + 10a + 25$

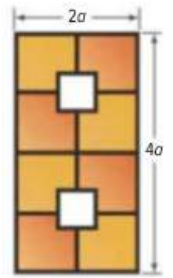
Real-World Example 3 Find Dimensions

DESIGN An artist is designing a stained glass window. It will be made up of pieces of colored glass and 2 clear squares as shown. Each clear square has a side length of 8 inches.

a. Write a polynomial that represents the area of the colored glass.

b. Factor the polynomial completely.

3. Write the factored form of a polynomial that represents the area of the colored glass if the clear squares have a side length of 6 inches.

**Example 4** Factor Completely

Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

a. $5x^2 - 80$

b. $9x^2 - 6x - 35$

c. $18x^4 + 24x^2 + 8$

4A. $2x^2 - 32$

4B. $12x^2 + 5x - 25$

Example 5 Apply a Technique More Than Once

Factor $625 - x^4$.

5A. $2y^4 - 50$

5B. $6x^4 - 96$

5C. $2m^3 + m^2 - 50m - 25$

5D. $16y^4 - 1$



Example 1 Determine whether each polynomial is a difference of squares. Write *yes* or *no*. If so, factor it.

1. $q^2 - 121$

2. $4a^2 - 25$

3. $9n^2 + 1$

4. $x^2 - 16y^3$

5. $16m^2 - k^4$

6. $r^2 - 9t^2$

Example 2 Determine whether each polynomial is a perfect square trinomial. Write *yes* or *no*. If so, factor it.

7. $25x^2 + 60x + 36$

8. $6x^2 + 30x + 36$

9. $y^4 + 2y^2 + 1$

10. $25x^2y^2 - 20xy + 4y^2$

Examples 4-5 Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

11. $u^4 - 81$

12. $2d^4 - 32f^4$

13. $20r^4 - 45n^4$

14. $256n^4 - c^4$

15. $2c^3 + 3c^2 - 2c - 3$

16. $3f^2 - 24f + 48$

17. $3t^3 + 2t^2 - 48t - 32$

18. $w^3 - 3w^2 - 9w + 27$

8-7 Skills Practice

Factoring Special Products

Determine whether each trinomial is a perfect square trinomial. Write *yes* or *no*. If so, factor it.

1. $m^2 - 6m + 9$

2. $r^2 + 4r + 4$

3. $g^2 - 14g + 49$

4. $2w^2 - 4w + 9$

5. $4d^2 - 4d + 1$

6. $9n^2 + 30n + 25$

Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

7. $a^2 - 4$

8. $n^2 - 64$

9. $36t^2 - 24t + 4$

10. $4h^2 - 56$

11. $17a^2 - 24ab$

12. $q^2 - 14q + 36$

13. $y^2 + 24y + 144$

14. $6d^2 - 96$

15. $1 - 49d^2$

16. $-16 + p^2$

17. $k^2 + 25$

18. $36 - 100w^2$

19. $t^2 - 18t + 81$

20. $4h^2 - 25g^2$

21. $64m^2 - 9y^2$

22. $4c^2 + 2cd + d^2$