

## 5.2 Part 2 FACTORING USING SPECIAL PRODUCT PATTERNS

### *Special Factoring Patterns*

#### 1. FACTORING DIFFERENCE OF SQUARES

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

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

$$x^2 - 49 = (x - 7)(x + 7)$$

$$64x^2 - 25 = (8x - 5)(8x + 5)$$

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

*What is the pattern?*

# Special Factoring Patterns

## 2. PERFECT SQUARE TRINOMIALS

$$x^2 + 14x + 49 = (x + 7)^2$$

$(x+7)(x+7)$

$$x^2 - 8x + 16 = (x - 4)^2$$

$$4x^2 - 20x + 25 = (2x - 5)^2$$

$$9x^2 + 12x + 4 = (3x + 2)^2$$

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

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

What is the pattern?

## $a^2 - b^2 = (a - b)(a + b)$ Examples

Factor completely.

1.  $25x^2 - 144$

$$(5x - 12)(5x + 12)$$

2.  $4x^2 + 4x + 1$

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

3.  $100 - x^2$

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

4.  $16x^2 - 56x + 49$

$$(4x - 7)^2$$

*Practice*

$$a^2 - 2ab + b^2 = (a-b)^2 \quad a^2 + 2ab + b^2 = (a+b)^2$$

Factor completely.

5.  $4x^2 - 121$

$(2x - 11)(2x + 11)$

6.  $9x^2 - 24x + 16$

$(3x - 4)^2$

7.  $225 - x^2$

$(15 - x)(15 + x)$

8.  $x^2 + 10x + 25$

$(x + 5)^2$

9.  $10x^2 - 13x - 3$

Sum $-13$	product $-30$
-----------	---------------

$2 + -15$	$2 \cdot -15$
-----------	---------------

$$\frac{1}{5} = \cancel{\frac{2}{10}} \quad \cancel{\frac{-15}{10}} = \frac{-3}{2}$$

$(5x + 1)(2x - 3)$

*Answers*

Factor completely.

5.  $4x^2 - 121$

$(2x - 11)(2x + 11)$

6.  $9x^2 - 24x + 16$

$(3x - 4)^2$

7.  $225 - x^2$

$(15 - x)(15 + x)$

8.  $x^2 + 10x + 25$

$(x + 5)^2$

9.  $10x^2 - 13x - 3$

$(2x - 3)(5x + 1)$

$$a^2 - b^2 = (a-b)(a+b) \text{ Practice}$$

Factor completely.

10.  $12x^2 - 3$   $\cancel{A(F=3)}$

11.  $45x^2 + 10x$   $A(F=5x)$

$$3(4x^2 - 1) = 3(2x-1)(2x+1)$$

$$5x(9x + 2)$$

12.  $8x^2 - 24x + 18$

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

14.  $6x^2 + 13x - 5$

Answers

Factor completely.

10.  $12x^2 - 3$

11.  $45x^2 + 10x$

$$3(2x - 1)(2x + 1)$$

$$5x(9x + 2)$$

12.  $8x^2 - 24x + 18$

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

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

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

14.  $6x^2 + 13x - 5$

$$(2x + 5)(3x - 1)$$

*Practice*

Solve by factoring.

15.  $4x^2 = 24x$

16.  $16x^2 - 361 = 0$

17.  $20x = 25x^2 + 4$

18.  $2x^2 + 7x - 15 = 0$

*Answers*

Solve by factoring.

15.  $4x^2 = 24x$   
 $x = 0, 6$

16.  $16x^2 - 361 = 0$   
 $x = \pm 19/4$

17.  $20x = 25x^2 + 4$   
 $x = 2/5$

18.  $2x^2 + 7x - 15 = 0$   
 $x = -5, 3/2$

19. You have a rectangular vegetable garden in your backyard that measures 15 feet by 10 feet. You want to double the area of the garden by adding the same distance  $x$  to the length and width of the garden. Find the value of  $x$  and the new dimensions of the garden.

20. A rectangular performing platform in a park measures 10 feet by 12 feet. You want to triple the platform's area by adding the same distance  $x$  to the length and the width. Find the new length and the width.