Name _____ Date _____ Class _____

LESSON 8-5

Practice B

Factoring Special Products

Determine whether each trinomial is a perfect square. If so, factor it. If not, explain why.

1. $x^2 + 6x + 9$

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

3. $36x^2 - 24x + 16$

4. $9x^2 - 12x + 4$

5. A rectangular fountain in the center of a shopping mall has an area of $(4x^2 + 12x + 9)$ ft^2. The dimensions of the fountain are of the form $cx + d$, where c and d are whole numbers. Find an expression for the perimeter of the fountain. Find the perimeter when $x = 2$ ft.

Determine whether each binomial is the difference of two squares. If so, factor it. If not, explain why.

6. $x^2 - 16$

7. $9b^4 - 200$

8. $1 - m^6$

9. $36s^2 - 4t^2$

10. $x^2y^2 + 196$

LESSON 8-5

Practice A

Factoring Special Products

Factor each perfect square trinomial by filling in the blanks.

1. $x^2 + 10x + 25 = (x + 5)(x + \boxed{5}) = (\boxed{x} + \boxed{5})^2$

$x \cdot x \quad 2(x \cdot 5) \quad 5 \cdot 5$

2. $9x^2 + 6x + 1 = (3x + \boxed{1})(\boxed{3x} + 1) = (\boxed{3x} + \boxed{1})^2$

$\boxed{3x} \cdot 3x \quad \boxed{2}(3x \cdot 1) \quad 1 \cdot \boxed{1}$

Factor each perfect square trinomial.

3. $x^2 - 18x + 81$ $(x - 9)^2$

4. $36x^2 + 24x + 4$ $(6x + 2)^2$

Complete the following sentences.

5. $x^2 + 6x + 6$ is not a perfect square trinomial because

6 is not a perfect square.

6. $4x^2 + 12x + 36$ is not a perfect square trinomial because

$12x \neq 2(2x \cdot 6)$.

7. A square floor tile has an area of $(x^2 + 8x + 16)$ in^2. The side length of the tile is of the form $cx + d$, where c and d are whole numbers.

a. Find an expression for the side length of the tile. $x + 4$ in.

b. Find an expression for the perimeter of the tile. $4(x + 4)$ in.

c. Find the perimeter when $x = 8$ in. 48 in.

Factor each binomial into the difference of two squares.

8. $x^2 - 9 = (x + \boxed{3})(x - \boxed{3})$

9. $4p^2 - 49 = (\boxed{2p} + \boxed{7})(\boxed{2p} - \boxed{7})$

10. $t^6 - 144$ $(t^3 + 12)(t^3 - 12)$

11. $16x^{10} - y^2$ $(4x^5 + y)(4x^5 - y)$

Complete the following sentences.

12. $25n^2 - 20$ is not a difference of squares because

20 is not a perfect square.

13. $9m^4 + 1$ is not a difference of squares because

the operation between the two squares is addition.

LESSON 8-5

Practice B

Factoring Special Products

Determine whether each trinomial is a perfect square. If so, factor it. If not, explain why.

1. $x^2 + 6x + 9$

yes; $(x + 3)^2$

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

yes; $(2x + 5)^2$

3. $36x^2 - 24x + 16$

no; $24x \neq 2(6x \cdot 4)$

4. $9x^2 - 12x + 4$

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

5. A rectangular fountain in the center of a shopping mall has an area of $(4x^2 + 12x + 9)$ ft^2. The dimensions of the fountain are of the form $cx + d$, where c and d are whole numbers. Find an expression for the perimeter of the fountain. Find the perimeter when $x = 2$ ft.

$4(2x + 3)$ ft; 28 ft

Determine whether each binomial is the difference of two squares. If so, factor it. If not, explain why.

6. $x^2 - 16$

yes; $(x + 4)(x - 4)$

7. $9b^4 - 200$

no; 200 is not a perfect square.

8. $1 - m^6$

yes; $(1 + m^3)(1 - m^3)$

9. $36s^2 - 4t^2$

yes; $(6s + 2t)(6s - 2t)$

10. $x^2y^2 + 196$

no; the operation between the two squares is addition.

LESSON 8-5

Practice C

Factoring Special Products

Determine whether each trinomial is a perfect square. If so, factor it. If not, explain why.

1. $16x^2 + 72x + 81$

yes; $(4x + 9)^2$

2. $x^2 - 14x - 49$

no; the last term must be positive.

3. $x^2 - 2x + 1$

yes; $(x - 1)^2$

4. $x^6 + 16x^3 + 64$

yes; $(x^3 + 8)^2$

5. The area of a rectangular frame for Ken's artwork is given by $(25x^2 - 20x + 4)$ cm^2. The dimensions of the frame are of the form $cx + d$, where c and d are whole numbers. Find an expression for the perimeter of the frame. Find the perimeter when $x = 13$ cm.

$4(5x - 2)$ cm; 252 cm

Determine whether each binomial is the difference of two squares. If so, factor it. If not, explain why.

6. $9y^2 - 121$

yes; $(3y + 11)(3y - 11)$

7. $49 - t^6$

yes; $(7 + t^3)(7 - t^3)$

8. $d^9 - 25$

no; d^9 is not a perfect square.

9. $16p^4 - 100q^2$

yes; $(4p^2 + 10q)(4p^2 - 10q)$

10. $x^4y^{10} + 324$

no; the operation between the two squares is addition.

LESSON 8-5

Reteach

Factoring Special Products

If a polynomial is a perfect square trinomial, the polynomial can be factored using a pattern.

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

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

Determine whether $4x^2 + 20x + 25$ is a perfect square trinomial. If so, factor it. If not, explain why.

Step 1: Find a, b, then $2ab$.

$a = \sqrt{4x^2} = 2x$ *The first term is a perfect square.*

$b = \sqrt{25} = 5$ *The last term is a perfect square.*

$2ab = 2(2x)(5) = 20x$ *Middle term* $(20x) = 2ab$.

Therefore, $4x^2 + 20x + 25$ is a perfect square trinomial.

Step 2: Substitute expressions for a and b into $(a + b)^2$.

$(2x + 5)^2$

Determine whether $9x^2 + 25x + 36$ is a perfect square trinomial. If so, factor it. If not, explain why.

Step 1: Find a, b, then $2ab$.

$a = \sqrt{9x^2} = 3x$ *The first term is a perfect square.*

$b = \sqrt{36} = 6$ *The last term is a perfect square.*

$2ab = 2(3x)(6) = 36x$ *Middle term* $(25x) \neq 2ab$.

STOP

Because $25x$ does not equal $2ab$, $9x^2 - 25x + 36$ is not a perfect square trinomial.

Determine whether each trinomial is a perfect square. If so, factor it. If not, explain why.

1. $9x^2 + 30x + 100$

$a =$ $3x$

$b =$ 10

$2ab =$ $60x$

Factor or explain:

$60x \neq 2ab$

2. $x^2 - 14x + 49$

$a =$ x

$b =$ 7

$2ab =$ $14x$

Factor or explain:

$(x - 7)^2$

3. $25x^2 + 20x + 4$

$a =$ $5x$

$b =$ 2

$2ab =$ $20x$

Factor or explain:

$(5x + 2)^2$