

3-3

Special Factoring

Objectives:

1. I can expand and factor perfect square trinomials.
2. I can factor the difference of two squares.

Warm-Up

Expand each of the following:

$$(x-5)^2$$

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

$$x^2 - 5x - 5x + 25$$

$$x^2 - 10x + 25$$

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

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

$$(x+6)^2$$

$$x^2 + 12x + 36$$

$$(3x-4)^2$$

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

Can you see a PATTERN?

Factoring Perfect Square Trinomials

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

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

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

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

Expand

$$(7x + 6)^2$$

$a = 7x$   
 $b = 6$

$$(10x - 3)^2$$

$$49x^2 + 84x + 36$$

$$100x^2 - 60x + 9$$

$$(7x+6)(7x+6)$$

$$49x^2 + 72x + 42x + 36$$

$$49x^2 + 84x + 36$$

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

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

Expand: Your Turn!

$$(12x + 2)^2$$

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

$$144x^2 + 48x + 4$$

$$9x^2 - 30x + 25$$

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

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

Factor each quadratic expression

$$x^2 + 4x + 4$$

$$x^2 - 20x + 100$$

$$x^2 + 2x + 2x + 4$$

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

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

$$(x-10)^2$$

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

Factor each quadratic expression

$$d^2 - 2d + 1$$

$$(d-1)^2$$

$$r^2 + 6r + 9$$

$$(r+3)^2$$

Factor each quadratic expression

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

$$(2x+3)^2$$

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

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

YOUR TURN!

Factor each quadratic expression

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

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

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

$$(3x-4)^2$$

$$16x^2 + 40x + 25$$

$$(4x+5)^2$$

$$\begin{array}{l} x^2 + 10x + 16 \\ (x^2 + 2x) + (8x + 16) \\ x(x+2) + 8(x+2) \\ \boxed{(x+8)(x+2)} \end{array}$$

$$\begin{array}{l} 16 \\ 1, 16 \\ 2, 8 \\ 4, 4 \end{array}$$

Factoring the difference of two squares

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

$$\begin{array}{l} x^2 - y^2 = (x+y)(x-y) \\ x^2 - xy + xy - y^2 \\ x^2 - y^2 \end{array}$$

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

Factor the following quadratic expressions

$$x^2 - 25$$

$$\begin{array}{l} x^2 + 0x - 25 \\ (x^2 - 5x) + (5x - 25) \\ x(x-5) + 5(x-5) \\ (x-5)(x+5) \end{array}$$

$$\begin{array}{l} -25 \\ 1, 25 \\ -5, -5 \end{array}$$

$$9n^2 - 1$$

$$(3n+1)(3n-1)$$

Factor each of the quadratic expressions

$$25x^2 - 81$$

$$(5x+9)(5x-9)$$

$$z^2 - 16$$

$$(z-4)(z+4)$$

Factor the quadratic expressions

$3x^2 - 48$

$x^4 - 81$

$$3(x^2 - 16)$$

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

$$(x^2+9)(x^2-9)$$

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

YOUR TURN!

Factor the quadratic expressions

$x^2 - 100$

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

$$z^4 - 16$$

$$(z+4)(z-2)(z+2)$$

YOUR TURN!

Factor the following quadratic expressions

$c^2 + 24c + 144$

$x^2 - 6x + 9$

$x^2 - 49$

$(c+12)^2$

$(x-3)^2$

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

$$x^2 + 0x - 49$$

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

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

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

Can I expand and factor perfect square trinomials?

Can I factor the difference of two squares?

Expand  $(3x - 11)^2 = 9x^2 - 66x + 121$

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

Factor  $4x^2 - 49 = (2x+7)(2x-7)$