

Lesson 6.4 Factoring Special Forms

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Lesson 6.4
Factoring



Factoring and Solving Equations



6.4 Factoring Polynomials with Special Forms

What You Will Learn

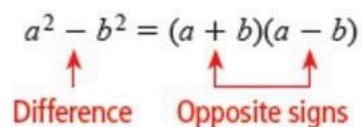
- ▶ Factor the difference of two squares.
- ▶ Factor a polynomial completely.
- ▶ Identify and factor perfect square trinomials.
- ▶ Factor the sum or difference of two cubes.

Difference of Two Squares 1

Difference of Two Squares

Let a and b be real numbers, variables, or algebraic expressions

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


Difference Opposite signs

To recognize perfect square terms, look for coefficients that are squares

To recognize perfect square terms, look for coefficients that are squares of integers and for variables raised to even powers. Here are some examples.

Original Polynomials		Difference of Squares		Factored Form
$x^2 - 1$	→	$(x)^2 - (1)^2$	→	$(x + 1)(x - 1)$
$4x^2 - 9$	→	$(2x)^2 - (3)^2$	→	$(2x + 3)(2x - 3)$

4
9
16
25
36
49
64
81
100



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Example 1 – Factoring the Difference of Two Squares

a. $x^2 - 36 = (x + 6)(x - 6)$

b. $81x^2 - 49 = (9x + 7)(9x - 7)$

c. Factor the polynomial $20x^3 - 5x$

$5x(4x^2 - 1)$
 $5x(2x + 1)(2x - 1)$



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Example 2 – Removing a Common Monomial Factor First 1

A hammer is dropped from the roof of a building. The height of the hammer is given by the expression $-16t^2 + 64$, where t is the time in seconds.

$$\begin{array}{r} h = -16t^2 + 64 \\ 41 = -16t^2 + 64 \\ \underline{-64} \quad \underline{-64} \\ -23 = -16t^2 \\ \underline{-16} \quad \underline{-16} \end{array}$$



$$\begin{array}{l} -16(t^2 - 4) \\ -16(t+2)(t-2) \end{array}$$

a. Factor the expression.

b. How many seconds does it take the hammer to fall to a height of 41 feet?

$$1.44 = t^2 \quad \sqrt{1.44} = t$$

$$1.2 = t$$

1.2 seconds



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Perfect Square Trinomials 1

A **perfect square trinomial** is the square of a binomial.

a.) Factor: $x^2 + 4x + 4 = (x+2)(x+2) = (x+2)^2$

b.) Factor the trinomial $y^2 - 6y + 9$.

$$(y-3)(y-3)$$

Handwritten work shows the trinomial $y^2 - 6y + 9$ with a curved line above it. Below the line, the factors $(y-3)$ and $(y-3)$ are written in green. A small '2' is written next to the second $(y-3)$.

c.) Factor the trinomial $16x^2 + 40x + 25$

$$(4x+5)(4x+5)$$

Handwritten work shows the trinomial $16x^2 + 40x + 25$ with a curved line above it. Below the line, the factors $(4x+5)$ and $(4x+5)$ are written in purple. A small '2' is written next to the second $(4x+5)$.



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