7.5 Factor Trinomials $x^2 + bx + c$

Essential Question: How do you reverse FOIL?

Standard Form	Factored Form
$x^2 + 8x + 12$	$(x + 6)(x + 2)$
$x^2 - 7x + 12$	$(x - 4)(x - 3)$
$x^2 - 2x - 15$	$(x + 3)(x - 5)$
$x^2 + 2x - 24$	$(x + 6)(x - 4)$

Examine the factored form of each polynomial. Find the sum of the constant terms in each set of parentheses (don't forget to use the given sign). Compare your answers to the Standard Form of each polynomial. Is there a pattern? If so, what is it? Find the product of the constant terms in each set of parentheses (again, be sure to use the correct sign). Compare your answers to the standard form of each polynomial. Is there a pattern? If so, what is it?

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Match the factored form with the standard form.

FOIL

1. $(x + 2)(x + 6)$ → A. $x^2 + 7x + 12$
   2x, 6x
2. $(x + 12)(x + 1)$ → B. $x^2 + 8x + 12$
   12x, 1x
3. $(x + 3)(x + 4)$ → C. $x^2 + 13x + 12$
   3x, 4x

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What You Will Learn

- Factor $x^2 + bx + c$.
- Use factoring to solve real-life problems.

Factoring $x^2 + bx + c$

Writing a polynomial as a product of factors is called *factoring*. To factor $x^2 + bx + c$ as $(x + p)(x + q)$, you need to find p and q such that $p + q = b$ and $pq = c$.

$$(x + p)(x + q) = x^2 + px + qx + pq$$
$$= x^2 + (p + q)x + pq$$

Core Concept

Factoring $x^2 + bx + c$ When c Is Positive

Algebra $x^2 + bx + c = (x + p)(x + q)$ when $p + q = b$ and $pq = c$.
When c is positive, p and q have the same sign as b.

Examples $x^2 + 6x + 5 = (x + 1)(x + 5)$
$x^2 - 6x + 5 = (x - 1)(x - 5)$

Core Concept

Factoring $x^2 + bx + c$ When c Is Negative

Algebra $x^2 + bx + c = (x + p)(x + q)$ when $p + q = b$ and $pq = c$.
When c is negative, p and q have different signs.

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

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Factor when "c" is positive

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$x^2 + 10x + 16$

$(x + 2)(x + 8)$

1 16
2 8
4 4

$x^2 + 9x + 14$

$(x + 2)(x + 7)$

1 14
2 7

$x^2 - 8x + 12$

$(x - 2)(x - 6)$

12
1 12
2 6
3 4

$x^2 - 12x + 27$

$(x - 3)(x - 9)$

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Factor when "c" is negative

$x^2 + 4x - 21$

$(x - 3)(x + 7)$

-21: $-1, 21$; $-3, 7$

$x^2 + 7x - 8$

$(x - 1)(x + 8)$

-8: $-1, 8$; $-2, 4$

$w^2 - 15w - 100$

$(w + 5)(w - 20)$

-100: $1, -100$; $2, -50$; $4, -25$; $5, -20$; $10, -10$

$m^2 - 2mv - v^2$

not factorable

$m^2 - 2mv + v^2$

$(m - v)(m - v)$

$(m - v)^2$

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Solve ~~Factor~~ when "c" is negative

$x^2 + 4x - 21 = 0$

$(x + 7)(x - 3) = 0$

$x + 7 = 0 \quad x - 3 = 0$

$x = -7, 3$

$x^2 + 7x - 8 = 0$

$(x + 8)(x - 1) = 0$

$x + 8 = 0 \quad x - 1 = 0$

$x = -8, 1$

$w^2 - 15w - 100 = 0$

$m^2 - 2mv - v^2 = 0$

$(m - v)^2$

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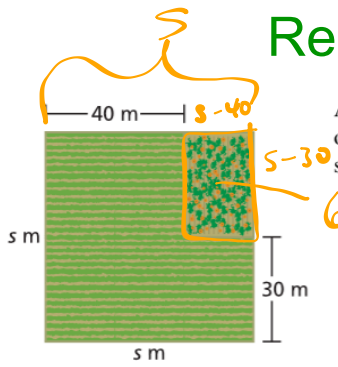
Real-World Application



A farmer plants a rectangular pumpkin patch in the northeast corner of a square plot of land. The area of the pumpkin patch is 600 square meters. What is the area of the square plot of land?

$600m^2$

$60(60)$

$3600m^2$

$(s-40)(s-30)=600$

$s^2-40s-30s+1200=600$

$s^2-70s+600=0$

$s=10, 60$

$(s-10)(s-60)=0$

$s-10=0 \quad s-60=0$

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7.5 Factor Trinomials

Assign p 389

1, 4 - 24 (e), 26 - 28, 33, 35, 43, 44

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