7.6 Factor ax² + bx + c trinomials

<u>Essential Question:</u> How do you factor a trinomial when x^2 has a coefficient other than 1?

What You Will Learn

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

Core Vocabulary

Previous
polynomial
greatest common factor (GCF)
Zero-Product Property

Factoring $ax^2 + bx + c$

In Section 7.5, you factored polynomials of the form $ax^2 + bx + c$, where $a = 1$. To factor polynomials of the form $ax^2 + bx + c$, where $a \neq 1$, first look for the GCF of the terms of the polynomial and then factor further if possible.

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1) We want the value of "a" in $ax^2 + bx + c$ (descending order) to be positive, if not factor out a "-1" from the trinomial.

2) Look for an overall GCF of all 3 terms, if there is a gcf, factor it out.

3) Then reverse FOIL the trinomial. Factor

Factor $5x^2 + 15x + 10$.

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

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

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Examples:

Factor each polynomial.

a. $4x^2 + 13x + 3$

FF   OI   L·L

1   4   1·3
2   2

$(4x + 1)(1x + 3)$

x

$12x$

b. $3x^2 - 7x + 2$

x	$3x$
1	2

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

$-6x$
$-x$

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More Examples: Factor.

c. $2x^2 - 5x - 7$

1   2   1   -7

$(x + 1)(2x - 7)$

$2x$

$-7x$

d. $-4x^2 - 8x + 5$

$-1(4x^2 + 8x - 5)$

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

x	$4x$
$2x$	$2x$
-1	5

$\frac{1}{10x}$

0

$-2x$

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YOUR TURN:

Factor: $8x - 8x^2 + 6$

$-8x^2 + 8x + 6$

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

$\boxed{-2(2x+1)(2x-3)}$

$2x$

$-6x$

$1x \quad 4x$

$2x \quad 2x$

$1 \qquad 3$

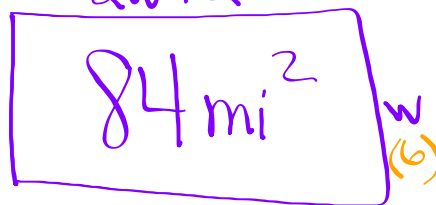| $\frac{1}{2}$	$\frac{8}{4}$
1	6
2	3
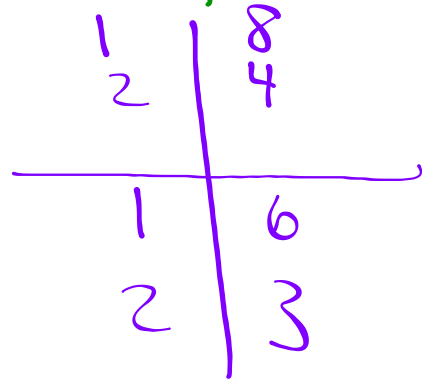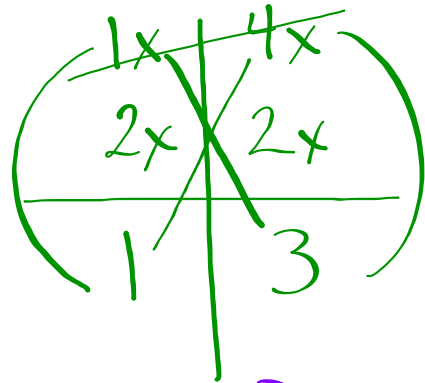
Real-Life Problem

The length of a rectangular state park is 2 miles longer than twice the width. The area of the park is 84 square miles. What is the width of the park? $2(6)+2$

$2w+2$

$\boxed{84\,mi^2}$ w

$\boxed{6\,mi}$

Reminder that any algebraic problem dealing with a shape should be sketched and all dimensions labeled!

$A = lw$

$84 = (2w+2)(w)$

$84 = 2w^2 + 2w$

(6) $\dfrac{0}{2} = \dfrac{2w^2 + 2w - 84}{2}$

$0 = w^2 + w - 42$

$0 = (w+7)(w-6)$

$w+7=0 \quad w-6=0$

$w = \cancel{-7}, 6$

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Factoring trinomials takes perseverance and an understanding that you don't just check if first x first and last x last multiplies out correctly, you also need the ==outside== and ==inside== product to total to the middle term!!!!

$6x^2 + 38x + 12 = (3x + 2)(2x + 6)$ Thoughts?

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A non-LHS student factored a trinomial and got 2 factors of (4x + 2)(5x - 15). Show by 2 different ways that the student forgot to factor out the overall GCF first.

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

$$10(2x+1)(x-3)$$

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7.6 Factor Trinomials with a Lead Coefficient

Day 1

WS from the Workbook

Day 2

WS A/B

Day 3

pg. 395: 1, 2 - 24(e), 25 - 28, 36, 44

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