Factoring Complex Trinomials ($ax^2 + bx + c$, $a \neq 1$)
Part 2

Apr. 7/2010

2. Breaking Up the Middle Term (bx)

Expand (x + 4)(2x + 3). What are the x-terms?

$(x+4)(2x+3) = 2x^2 \underbrace{+3x+8x}_{x\text{-terms}} + 12$

$3x + 8x = 11x$

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Expand (x + 4)(2x + 3). What are the x-terms?

$(x + 4)(2x + 3) = 2x^2 + 3x + 8x + 12$

$= 2x^2 + 11x + 12$

To factor $2x^2 + 11x + 12$, we need to do these steps in reverse order.

How do the numbers 3 and 8 relate to 2, 11, and 12?

$3 + 8 = 11$ $3 \times 8 = 2 \times 12 = 24$

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Once you have broken the middle term, you can <u>factor by grouping</u>

$2x^2 + 11x + 12 = 2x^2 + 3x + 8x + 12$

$= x(2x+3) + 4(2x+3)$

the factors must be the same for this to work

$= (2x+3)(x+4)$

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Ex. Factor $6m^2 + 13m - 5$

Numbers add to: 13 (sum)

Numbers multiply to: -30 (product)

$= 6(-5)$

Numbers are:

-2 and 15 (integers)

This technique is called SPI (sum, product, integers)

Product of -30	Sum
$6(-5)$	1 ✗
$-3(10)$	7 ✗
$3(-10)$	-7 ✗
$-2(15)$	13 ✓

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Ex. Factor $6m^2 + 13m - 5$

Numbers are: -2 and 15

Now factor by grouping:

$6m^2 + 13m - 5 = 6m^2 - 2m + 15m - 5$

$= 2m(3m-1) + 5(3m-1)$

$= (3m-1)(2m+5)$

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Ex. Factor: $10x^2 - 11x - 6$

Sum: -11

Product: -60

$10 + (-6) = 4$ ✗

$15 + (-4) = 11$ ✗

$-15 + 4 = -11$ ✓

Integers: $-15, 4$

$10x^2 - 11x - 6$

$= 10x^2 - 15x + 4x - 6$

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

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

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Assigned Work:

Handout Section 3.6

1 - 4 (skip any completed yesterday)
5

(don't forget common factors first)

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