P5 – Factoring Quadratic Equations

Factoring Quadratic Equations

Standard form of a quadratic equation - $ax^2 + bx + c = 0$

Zero Product Property
For any real numbers a and b, if $ab = 0$, then either $a = 0$, $b = 0$, or both a and b equal zero

Factoring quadratics when $a = 1$, first identify a, b, and c and find the factors m and n of c that add up to b

Then determine the signs of the factors based on the signs of b and c

If c is positive and b is positive $ax^2 + bx + c = 0$ When c is positive the signs of the factors will be the same and the sign of b tells us the what that sign is $(x + m)(x + n) = 0$	If c is positive and b is negative $ax^2 - bx + c = 0$ When c is positive the signs of the factors will be the same and the sign of b tells us the what that sign is $(x - m)(x - n) = 0$
If c is negative and b is positive $ax^2 + bx - c = 0$ When c is negative, the signs of the factors are different and the sign of b tells us the sign of the larger factor (let $m > n$) $(x + m)(x - n) = 0$	If c is negative and b is negative $ax^2 - bx - c = 0$ When c is negative, the signs of the factors are different and the sign of b tells us the sign of the larger factor (let $m > n$) $(x - m)(x + n) = 0$

Example 1 Solve by Factoring

a) $x^2 - 8x + 12 = 0$

$(x-6)(x-2) = 0$

$x = 6 \quad x = 2$

b) $x^2 + 2x - 3 = 0$

$(x+3)(x-1) = 0$

$x = -3 \quad x = 1$

HW: (23, 24, 25, 28)

Solve each equation by factoring. (Example 4)

23. $x^2 - 10x + 21 = 0$

24. $p^2 - 6p + 5 = 0$

25. $x^2 - 3x - 28 = 0$

26. $4w^2 + 19w - 5 = 0$

27. $4r^2 - r = 5$

28. $g^2 + 6g - 16 = 0$

Factoring when $a \neq 1$

Factoring when $a \neq 1$

Step 1	Multiply a and c
Step 2	Find factors of ac with a sum of b
Step 3	Rewrite as a 4-term polynomial using the factors from step 2
Step 4	Factor by grouping or boxing

Example 1 Factor

a. $3x^2 + 16x + 5 = 0$

Group 15:1

$(3x^2 + 15x) + (x + 5) = 0$

$3x(x + 5) + 1(x + 5) = 0$

$(3x + 1)(x + 5) = 0$

$x = -\frac{1}{3}$ $x = -5$

$3x + 1 = 0$

-1

$\frac{-1}{3}$

b. $5x^2 - 9x - 2 = 0$

-10

$5x^2$	$-10x$	$5x$
x	-2	1
x	-2	

$(5x + 1)(x - 2) = 0$

$x = -\frac{1}{5}$ $x = 2$

Factoring Trinomials When $a > 1$

Use a separate sheet of paper.

Factor by Grouping.

1. $3x^2 + 16x + 5 = 0$
2. $6x^2 - 11x - 2 = 0$
3. $5x^2 - 9x - 2 = 0$
4. $6x^2 - 11x - 10 = 0$

Factor by Boxing.

5. $10x^2 + 17x + 6 = 0$
6. $14x^2 - 15x + 4 = 0$
7. $8x^2 + 2x - 3 = 0$
8. $2x^2 + 19x - 10 = 0$