6-5

Factoring Quadratic Expressions

Objectives: I can factor quadratic expressions in standard form.

Factor each quadratic expression

$x^2 + 4x + 3$

$1 + 3$

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

$3m^2 + 6m + 3$

$3(m^2+2m+1)$

$1+1$

$3(m+1)(m+1)$

$3(m+1)^2$

Factor each quadratic expression

$35 - 12x + x^2$

$x^2 - 12x + 35$

$(x-5)(x-7)$

$x^2 - 6x - 7$

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

How to Factor a Quadratic

Factoring quadratics in the form $ax^2 + bx + c$

1. Factor out the GCF
2. Multiply a and c
3. Find two factors of ac that add to b
   *If ac is negative, factor.s must have opposite signs
   *If ac is positive, factors must have same (+ or -) signs
4. Re-write equation with b split up into factors
5. Find the GCF by grouping
6. Factor the GCF of the whole

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Example:

$x^2 + 5x + 4$

1. GCF = 1
2. $1 \cdot 4 = 4$
3. 1, 4 or 2, 2
   $1 + 4 = 5$
   $x^2 + 5x + 4$
4. $x^2 + x + 4x + 4$
5. $x(x + 1) + 4(x+1)$
6. $(x + 1)(x + 4)$

Factor each quadratic expression

$4x^2 + 2x - 5$ $\quad 4 \cdot -5 = -20$

Nonfactorable

$2p^2 - 2p - 20$

$2(p^2 - p - 10)$

Factor the quadratic expression

$2a^2 + 9a + 4$ $\quad 2 \cdot 4 = 8$ $\quad 8 + 1$

$2a^2 + 8a + a + 4$

$2a(a+4) + 1(a+4)$

$(a+4)(2a+1)$

YOUR TURN!

Factor each quadratic expression

$3n^2 - 27n + 60$

$3(n^2 - 9n + 20)$

$3(n-4)(n-5)$

$4x^2 - 13x + 3$ $\quad 4 \cdot 3 = 12$ $\quad -12 \cdot -1$

$4x^2 - 12x - x + 3$

$4x(x-3) - 1(x-3)$

$(x-3)(4x-1)$

YOUR TURN!

Factor each quadratic expression

$2x^2 + 13x + 15$ $2 \cdot 15 = 30$

$2x^2+10x+3x+15$ 3 10

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

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

$6x^2 + 11x + 3 = 18$ 9 2

$6x^2+9x+2x+3$

$3x(2x+3)+(2x+3)$

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

$6x^2+2x+9x+3$

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

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

Check: Can I factor quadratic expressions in standard form?

Check: Factor $10x^2 + 7x + 1$