

Algebra 1

Lesson 9.6

Factor $ax^2 + bx + c$

Warm-Up

Solve.

(a) $x^2 + 3x = 0$

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

$$x = 0, -3$$

(b) $x^2 - 5x + 6 = 0$

$$(x-3)(x-2) = 0$$

$$x = 3, 2$$

(c) $x^2 + 9x = -20$

$$x^2 + 9x + 20 = 0$$

$$(x+5)(x+4) = 0$$

$$x = -5, -4$$

FOIL

Example 1. Factoring when the Leading Coefficient isn't 1

$$3x^2 + 22x + 7$$

$$(3x+1)(x+7)$$

	3x	1
x	3x ²	1x
7	21x	7

Annotations: 22x (from 3x*7 + 1*x), 21x (from 7*3x), 7 (from 7*1)

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

Annotations: -2x (from 2x*3 - 1*2x), 4x (from -1*3)

(a) $2x^2 + 5x - 12$

	2x	-3
x	2x ²	-3x
4	8x	-12

Annotations: 5x (from 2x*4 - 3*3), 8x (from 4*2x), -12 (from 4*-3)

	2x ²	
		-12

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

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

Annotations: -3x (from 2x*4 - 3*x), 8x (from -3*4)

(b) $6x^2 - 7x - 3$

	3x	-1
2x	6x ²	-2x
3	9x	-3

Annotations: 7x (from 3x*-1 - 2x*3), 9x (from 3*3x), -3 (from -1*3)

	3x	1
2x	6x ²	2x
-3	-9x	-3

Annotations: -7x (from 3x*1 - 9x*-3), -9x (from -3*3x)

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

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

	2x	-1
2x	4x ²	-2x
3	6x	-3

Annotations: 4x (from 2x*-1 - 2x*3), 6x (from 3*2x), -3 (from -1*3)

	4x ²	
		-3

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

Example 2. Solving by Factoring

Solve.

(a) $3t^2 + 8t + 4 = 0$

$$(3t+2)(t+2) = 0$$

$\underbrace{\quad\quad\quad}_{2t}$
 $\underbrace{\quad\quad\quad}_{6t}$

$$(3t+2)(t+2) = 0$$

$$t = -\frac{2}{3}, -2$$

(b) $4y^2 - 9y = -5$

$$4y^2 - 9y + 5 = 0$$

$$(4y-5)(y-1) = 0$$

$$4y-5=0 \text{ OR } y-1=0$$

\downarrow \downarrow
 $+5$ $+1$
 $4y=5$ $y=1$

$$y = \frac{5}{4} \text{ OR } y = 1$$

(c) $2x^2 = -13x + 7$

$$2x^2 + 13x - 7 = 0$$

$$(2x-1)(x+7) = 0$$

$$2x-1=0 \text{ OR } x+7=0$$

\downarrow \downarrow
 $2x=1$ $x=-7$

$$x = \frac{1}{2} \text{ OR } x = -7$$

Example 3. Factoring if the Leading Coefficient is Negative

Consider the expression $-3x^2 - 13x - 4$.

(a) Factor -1 out of *each* of the terms (as you would with a GCF).

$$-1(3x^2 + 13x + 4)$$

(b) Factor the trinomial that remains.

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

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

EXAMPLE 4

FACTOR:

$$4n^2 - 2n - 90$$

$$2(2n^2 - n - 45)$$

$$2(2n+9)(n-5)$$

$\underbrace{\quad\quad\quad}_{9n}$
 $\underbrace{\quad\quad\quad}_{-10n}$

*MUST PULL OUT THE GCF FIRST

Assignment

New: Pg. 596 #4 - 28 (evens)

Review:

Solve.

1. $4 - 2(3 - x) = -10$

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

3. $x(x + 2) = 24$

4. $2(3x - 4) - 3x + 6 = 7$

Simplify.

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

6. $(x - 4)(3x + 5)$

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

8. $(2x^2 - 4x + 2) - (3x - 4x^2 + 7)$