

Factoring Quadratic Trinomials

Standard Form of a Quadratic Trinomial

$$y = ax^2 + bx + c$$

a = coefficient of the x^2 term

b = coefficient of the x term

c = the constant (no variable present)

When factoring $ax^2 + bx + c$, find two factors of c whose sum is equal to b

Example 1 Factor $x^2 + 9x + 18$

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

Factors of 18	Sum of 9
18 · 1	19
9 · 2	11
6 · 3	9

Factors of 8	Sum of 6
-8 · 1	9
2 · 4	6

$$\boxed{(x+6)(x+3)}$$

When c is positive, the factors have the same sign

If b is positive, the signs of the factors are positive

If b is negative, the signs of the factors are negative

$$x^2 + bx + c$$

$$(x+m)(x+n)$$

Example 2 Factor

$$x^2 + 5x + 6 \quad (x+ \text{ })(x+ \text{ })$$

$$m \cdot n = 6$$

$$m+n = 5$$

$$m=2 \quad n=3$$

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

$$x^2 - bx + c$$

$$(x-m)(x-n)$$

$$x^2 - 10x + 16 \quad (x-2)(x-8)$$

$$m \cdot n = 16$$

$$m+n = -10$$

$$m = -2 \quad n = -8$$

$$(x-2)(x-8)$$

When c is negative, the factors will have opposite signs

If b is positive, the larger factor will also be positive

If b is negative, the larger factor will be negative

$$x^2 + bx - c$$

$$(x + m)(x - n)$$

Example 3 Factor

$\leftarrow m > n \rightarrow$

$$x^2 + 7x - 18$$

$$m \cdot n = -18$$

$$m + n = 7$$

$$m = 9 \quad n = -2$$

$$(x + 9)(x - 2)$$

$$x^2 - bx - c$$

$$(x - m)(x + n)$$

$$x^2 - 5x - 24$$

$$m \cdot n = -24$$

$$m + n = -5$$

$$m = -8 \quad n = 3$$

$$(x - 8)(x + 3)$$

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 factors from step 2
Step 4	Factor by grouping or boxing

*note: the same rules with signs will also apply

Example 4 Factor

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

S1 $3 \cdot 5 = 15$

S2 $15 \cdot 1 = 15$

$15 + 1 = 16$

S3 $3x^2 + 15x + 1x + 5$

54 Grouping

$$(3x^2 + 15x) + (1x + 5)$$

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

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

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

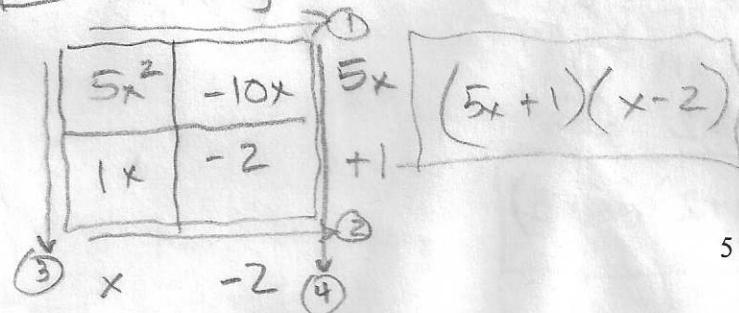
S1 $5 \cdot -2 = -10$

S2 $-10 \cdot 1 = -10$

$-10 + 1 = -9$

S3 $5x^2 - 10x + 1x - 2$

54 Boxing



Factoring Trinomials When $a > 1$

Factor by Grouping. Use a separate sheet of paper.

1. $3x^2 + 16x + 5$

2. $6x^2 - 11x - 2$

3. $5x^2 - 9x - 2$

4. $6x^2 - 11x - 10$

Factor by Boxing.

5. $10x^2 + 17x + 6$

6. $14x^2 - 15x + 4$

7. $8x^2 + 2x - 3$

8. $2x^2 + 19x - 10$

FAST METHOD

$$3x^2 + 16x + 5$$

① Mult. ac $3(5) = 15$

② Bring down $x^2 + 16x$ and add ac

$$x^2 + 16x + 15$$

③ factor

$$(x+15)(x+1)$$

④ divide a into factors

$$(x + \frac{15}{3})(x + \frac{1}{3})$$

⑤ Simplify

$$(x+5)(x+\frac{1}{3})$$

⑥ if you're left with a fraction,
the denominator becomes the
coefficient of x in that factor.

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