

Objective: To factor quadratic trinomials in the form $ax^2 + bx + c$ where $a > 1$.

Steps:

- 1.) Find the factors of the 1st term (ax^2)
- 2.) Find the factors of the last term (c)
- 3.) Connect the factors of the 1st term with factors of the last term to see if they can combine to equal the middle term (bx).
- 4.) Use the smile method to write in factored form using the connections from 3.



Example 1: Always check to see if you can factor out a GCF.

All terms must be able to divide by the largest number possible.

$$5x^2 + 15x + 10$$

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

$$\begin{array}{ccc} x & \times & 2 \\ x & \times & 1 \end{array}$$

$$\begin{array}{ccc} 2x & & x \\ \text{---} & & \text{---} \\ & 3x & \end{array}$$

$$5(x+1)(x+2)$$

★ Divide by the GCF to all in parenthesis, leaving GCF out in front.

Example 2: $4x^2 + 13x + 3$

$$\begin{array}{r} 4x \quad \text{---} \quad 3 \\ x \quad \text{---} \quad 1 \end{array}$$

$$\begin{array}{r} 12x \quad x \\ \text{---} \\ 13x \end{array}$$

Smile: $(4x + 1)(x + 3)$ Answer

Example 3: $3x^2 - 7x + 2$

$$\begin{array}{r} 3x \quad \text{---} \quad -2 \\ x \quad \text{---} \quad -1 \end{array}$$

$$\begin{array}{r} -6x \quad -x \\ \text{---} \\ -7x \end{array}$$

Smile: $(3x - 1)(x - 2)$ Answer

Example 4: $2x^2 - 5x - 7$

$$\begin{array}{r} 2x \quad \text{---} \quad -7 \\ x \quad \text{---} \quad 1 \end{array}$$

$$\begin{array}{r} 2x \quad -7x \\ \text{---} \\ -5x \end{array}$$

Smile: $(2x - 7)(x + 1)$ Answer

Example 5: $-4x^2 - 8x + 5$

* whenever the 1st term is negative, factor out the negative like it is a negative 1.

$$-1 (4x^2 + 8x - 5)$$

$$\begin{array}{ccc} 2x & \times & 5 \\ 2x & \times & -1 \end{array}$$

$$\begin{array}{ccc} -2x & 10x & \\ \hline & 8x & \end{array}$$

Smile and make sure
to leave the negative
out front.

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